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Prospective Payment for Medicare Home Health: A Promising System to Save Resources

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EXECUTIVE SUMMARY

As part of its ongoing effort to study methods of financing more cost-effective care, the Health Care Financing Administration (HCFA) implemented the Per-Episode Home Health Prospective Payment Demonstration. Under the demonstration, participating home health agencies are paid a fixed, lump-sum payment for the first 120 days of each episode of care provided to Medicare beneficiaries and a predetermined rate for each visit thereafter. By allowing agencies to retain most of any surplus payments over cost, this payment method gives agencies an incentive to provide home health care in a cost-efficient manner.

We find that the typical agency in the demonstration was able to earn small profits under the prospective payment system. They were able to do so by reducing their cost per episode by 14 percent—a decrease achieved by reducing service use. However, efforts also to reduce service use resulted in increases in the agencies cost per visit. This outcome effectively reduced profits, as approximately half an average agency's visits were paid according to the per-visit methodology, at a predetermined rate. Furthermore, the agencies' Medicare revenues fell by 20 percent, largely because the number of visits rendered after 120 days of care dropped as well. Although the small number of some types of agencies in our sample makes it difficult to draw firm conclusions, it appears that almost all types of agencies experienced these financial changes. These results suggest that HCFA could save resources relative to cost-reimbursement by implementing a prospective payment system.

BACKGROUND

Ninety-one agencies in five states entered the three-year demonstration at the start of their 1996 fiscal year. Prior to the start of the demonstration, the participating agencies were randomly assigned to either the treatment group or the control group. Agencies assigned to the treatment group have been reimbursed under the demonstration's prospective payment method, whereas those assigned to the control group continue to be reimbursed under Medicare's method of cost-based reimbursement (the payment method in effect for all home health agencies at the time the demonstration began).

For each patient admitted to home health care, treatment group agencies receive a lump-sum payment for the first 120 days of home health care, regardless of the number of visits provided or their cost.[1] The amount of the per-episode payment is based on each agency's own costs during the fiscal year immediately preceding its entry into the demonstration, adjusted for changes in its case mix and for inflation. An agency can receive a new per-episode payment for a given Medicare beneficiary only after the 120-day "at-risk" period has ended and a 45-day gap in services has taken place. For each visit after the at-risk period that does not begin a new episode (referred to as the

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[1] Some exceptions apply. For example, durable medical equipment, nonroutine medical supplies, and Part B ambulatory home health services continue to be reimbursed at cost.

"outlier" period), treatment agencies receive a fixed payment that varies by the type of visit and is again based on their own predemonstration costs.

HCFA reimburses treatment agencies for up to 99 percent of fiscal-year losses up to the (Section 223) cost-per-visit limits that apply to all agencies in the Medicare program. Profits in excess of specified limits must be shared with HCFA.

RESEARCH QUESTIONS AND METHODOLOGY

In this report, we test various hypotheses about the effects of prospective payment on agency finances. The most important of these hypotheses center on (1) the effect of prospective payment on the cost per episode, (2) the effect of prospective payment on agency profits, and (3) whether prospective payment reduced the agencies' Medicare revenues. We also analyze the effects of prospective payment on the cost and length of a home health visit.

The sample for the main analysis included approximately 80 demonstration agencies that provided cost reports. (Of the 91 original agencies, 8 were excluded from the analysis because they provided incomplete data, and 3 left the demonstration near its start.) Supplemental reports provided information on agency profits, and Medicare claims files provided the data on patient service use that we used in the analysis of cost per episode. An agency time-sheet survey was conducted to obtain information on the length of visits.

Fixed-effects models were the primary method used to estimate program effects, controlling for preexisting differences between treatment and control agencies. Despite the randomization of participating agencies, we observed several significant differences between treatment and control agencies other than the method of payment; consequently, the fixed-effects approach proved crucial to obtaining valid impact estimates. Analyses of the robustness of our regression estimates showed that they were not sensitive to the inclusion of either extreme observations or agencies in special circumstances. We also found no evidence that our results were affected by incomplete service use data, despite having to drop eight agencies from the analysis for this reason.

FINDINGS

Agencies Earned Small Profits Under the Demonstration

HCFA must have financially viable institutions to serve its beneficiaries. If a substantial number of agencies are unable to earn profits under the new payment system, then access to care could be harmed. We found that prior to any profit or loss sharing the typical agency earned very small profits on its Medicare services during the demonstration. In the first demonstration year, the typical agency broke even (earned neither a profit nor a loss) on its Medicare business. During the next two years, however, the overall profit rate increased.

Agencies Earned Profits by Reducing Cost per Episode by 14 Percent

Agencies earned their profits by responding to the primary demonstration incentive. In response to prospective payment, they reduced their cost per episode by an average of $457—or 14 percent—leading directly to agency profits. They did so by reducing the number of visits they provided during an episode. Indeed, throughout the demonstration, the prospectively paid agencies continued to reduce their service use, thereby lowering their cost per episode. However, this reduction did not translate into greater savings estimates over time. Because the environment in which the agencies operated changed as well, control agencies also reduced utilization and cost per episode.

Prospective Payment Increased Cost per Visit, Decreasing Agency Profits

The profits earned by reducing episode costs were offset by an increase in per-visit costs, which was a function of efforts to reduce service use. As a result of prospective payment, the per-visit costs for skilled nursing and home health aide services rose 14 percent and 10 percent, respectively. These services account for approximately 87 percent of the home health care visits rendered. Reductions in overall agency volume explain part of the increase in the per-visit cost (because overall volume fell more rapidly than did agencies' reductions in overhead costs). In addition, the methods agencies used to reduce the number of visits per episode, such as increased supervision, caused per-visit costs to increase; however, we found little evidence to suggest that the length of the visit was increasing. Agencies lost money on their outlier visits, because they were paid at a predetermined rate based on their predemonstration costs. These losses reduced the profits earned from per-episode payments.

Medicare Revenues Fell Substantially

The prospectively paid agencies' Medicare revenues dropped substantially during the demonstration, primarily because these agencies reduced visits during the outlier periods. The average prospectively paid agency's Medicare revenue dropped 20 percent per year relative to the decrease in the cost-reimbursed agencies. Revenues fell because agencies reduced revenue-generating visits that would have occurred after 120 days as they reduced their episode lengths. The result was savings for the Medicare program.

All Types of Agencies Responded to the Payment Incentives

Prospective payment generally produced strong and significant financial impacts, regardless of the type of agency. With a few exceptions, as a result of the prospective payment system, agencies of every type reduced their cost per episode, increased their cost per skilled nursing and home health aide visit, and reduced Medicare revenues. The limited number of agencies in our analysis sample makes it difficult to determine whether some types of agencies (most notably, hospital-based ones), responded differently to the payment system, but the evidence does show that almost all agencies generally responded in the same way to the demonstration's incentives.

LIMITATIONS OF THE ANALYSIS

Despite the significance and robustness of our findings, this study does have some important limitations. However, none of these limitations casts any doubt on the validity of the finding that agencies substantially reduced episode costs and Medicare revenues, while earning a small profit.

Demonstration Agencies May Have Behaved Differently from Agencies Nationally

Perhaps the most important limitation of this study is the extent to which we can generalize our findings to home health agencies nationwide. As might occur with any study design based on voluntary participation, the agencies in this demonstration may reflect the group best able (or most willing) to respond to the incentives of the intervention. Indeed, we do know that, relative to agencies nationwide, the demonstration agencies were larger, were more fully staffed, and underrepresented the national share of hospital and nonmetropolitan agencies (Foster 2000). Given these observed differences, it is possible that unobserved differences may have led us to under- or overstate the impacts. However, it is important to note that Foster also observed many other measures, especially agency costs, that indicated the demonstration agencies were very similar to agencies nationwide.

A key factor suggesting that our results can be widely generalized is that agencies of all types significantly reduced their cost per episode, increased per-visit costs, and reduced the amount of Medicare revenues they received. Thus, even though the mix of demonstration agencies differs significantly from agencies nationwide, we still expect the impacts of the new payment method to substantially affect these financial measures. Hospital-based agencies are a notable exception. Our sample contains only a small number of hospital-based demonstration agencies, and we have limited data on those that are enrolled; thus, the evidence we obtained may not indicate accurately how these agencies will be affected under a national prospective payment system.

A Demonstration Payment System Would Likely Differ from a National Payment System

A second limitation, related to the issue of generalizability, is that the national program of prospective payment (begun in October 2000) differs from the one implemented for the demonstration. For example, the new payment system will pay for a series of 60-day episodes, thus eliminating the need for a per-visit outlier payment. This new payment system could alter the financial impact of prospective payment, as agencies still would have the incentive to reduce visits in later periods to potentially earn profits, whereas in the demonstration they did not have this incentive.

Time Limitations May Affect Agency Response

A final limitation is that the time-limited nature of the demonstration may cause effects to vary from those that would result from a permanent policy change. Agencies may respond to payment incentives that they view as temporary differently from the way they would respond to incentives viewed as permanent. For example, in a permanent payment system, agencies may focus on reducing their overhead costs and may take aggressive actions, such as merging with other agencies, to lower the impact of the cost per visit. However, under the temporary payment system, agencies may have been far less likely to make these significant changes, especially as the environment to which the agencies may have been returning was changing dramatically, and the Medicare payment system to which they were returning was in the process of being altered. Thus, agencies were less likely to make costly organizational changes in return for a limited opportunity to earn profits, suggesting that the short-term financial impacts of prospective payment may have been overstated (cost per visit) or understated (profits).

LESSONS LEARNED

HCFA Can Save Resources by Using a Prospective Payment System but Must Be Prepared for Unintended Consequences

The evidence clearly shows that home health agencies will respond to financial incentives, such as those offered by the demonstration prospective payment system, and suggests that a new payment system based on these principles will enable HCFA to save resources. In addition, however, HCFA must be prepared to adjust for unintended consequences of the new payment system. In the early stages of the demonstration, for example, agencies perceived that the per-visit payment system for visits after 120 days was a safeguard (Phillips and Thompson 1997). The agencies were concerned about the effect that a high-volume patient would have on them, rather than about whether they had to control their cost per visit. Indeed, agencies had struggled to keep their cost per visit below the cost limits for years—and had done so successfully—so they viewed the risk of increasing costs per visit as relatively minor relative to the risk of having a patient with high-cost care needs. Yet, this per-visit payment system proved to be the key factor that limited agencies' profitability. Thus, it is important that HCFA monitor the payment system, and that it be prepared to make adjustments in the event that any unintended financial problems arise.

HCFA Should Monitor the New Payment System

In addition, HCFA must closely monitor the effect of a new payment system on agencies operating in sparsely populated areas. Our estimates show that approximately half the increase in cost per visit was due to the reduction in overall agency volume. Under a permanent system, one would expect agencies to consolidate so as to reduce their costs and recapture the economies of scale they lost when their volume declined. Sole agencies in sparsely populated areas may not be able to take this step.

I. THE PER-EPISODE HOME HEALTH DEMONSTRATION AND EVALUATION

The Per-Episode Home Health Prospective Payment Demonstration of the Health Care Financing Administration (HCFA) tests the extent to which prospective payment for Medicare home health services increases efficiency of service provision. Per-episode payment encourages efficiency by giving agencies the financial incentive to reduce their costs. Specifically, under the demonstration payment system, any savings generated from lower costs per episode of patient care might result in profits to the agency.[1] These incentives differ greatly from those under a system of cost-based reimbursement, which does not provide a reward for cost containment.

In this report, we present findings from an analysis of demonstration impacts on agency finances. These impacts are critical, as agencies must respond appropriately to the financial incentives if a prospective payment system is to work for Medicare. If agencies are unable to reduce costs while maintaining an acceptable level of quality, there would be little benefit in changing the payment system. Furthermore, if most agencies are unable to remain financially viable under the payment system, Medicare beneficiaries' access to care would be severely affected.

The remainder of this chapter provides an overview of the Medicare home health benefit and the Medicare-certified home health industry and describes the Per-Episode Home Health Prospective Payment Demonstration. A reader who is familiar with Medicare home health may wish to proceed directly to Section B, which describes the demonstration procedures.

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[1] Strictly speaking, only for-profit agencies earn profits; nonprofit agencies generate surpluses that cannot be distributed to "owners" of the organization. A for-profit firm can distribute profits (or surpluses) as it wishes, such as in the form of bonuses to employees, distributions to shareholders, and so forth. However, for brevity, we use the term "profits" in this report to refer to surpluses generated by nonprofit agencies, as well as to profits earned by for-profit agencies.

A. THE MEDICARE HOME HEALTH BENEFIT

Congress established the Medicare home health care benefit in 1965, when the original Medicare program was created. Home health benefits were included to offer beneficiaries with acute conditions a less intensive and less expensive alternative to inpatient hospital care. At different times since the inception of the Medicare program, the home health benefit has been modified, partly to increase access to care. Under the current benefit, home health services generally are covered under Part A; neither a deductible nor coinsurance applies.[2] To be eligible for home health benefits, a beneficiary must (1) have Medicare coverage; (2) be homebound; (3) be under the care of a physician; and (4) need skilled nursing, physical therapy, or speech therapy on a part-time or intermittent basis.[3]

Coverage under the home health benefit broadened considerably after the settlement of a lawsuit against HCFA in 1989 (Duggan v. Bowan), which, in turn, contributed to dramatic growth in Medicare home health expenditures after that time. Medicare payments for home health care rose from $2.4 billion in 1989 to $16.8 billion in 1997, more than tripling the share of total Medicare spending on home health (*Health Care Financing Review* 1998). Nearly all this growth has been due to an increase in the provision of services, which has coincided with a dramatic expansion in industry size. Between 1989 and 1997, the number of home health users per 1,000 beneficiaries rose from 51 to 109, and the average number of visits per user rose from 27 to 73 (*Health Care Financing Review* 1998; and U.S. General Accounting Office 2000).[4] Coinciding with this growth, the number of Medicare-certified home health agencies rose from 5,700 to more than 10,000 (U.S. General Accounting Office 1998). Service use patterns differed strikingly across regions throughout this period. In 1997, for example, the average number of visits per user ranged from 37 visits in Maryland to 161 visits in Louisiana (U.S. General Accounting Office 2000).

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[2] In some rare instances, such as when an individual does not qualify as homebound or does not have Part A coverage, home health care may be covered under Medicare Part B. In cases of ambulatory Part B home health, deductibles and copayments do apply. In addition, under the Balanced Budget Act of 1997, the long-term use of home health services was transferred to Part B. In these cases, there are no deductibles or copayments.

[3] Skilled nursing services are covered as long as (1) a physician has ordered them, (2) they are required on a part-time or intermittent basis, (3) they require the skills of a registered nurse (or of a licensed practical nurse or licensed vocational nurse under a registered nurse's supervision), and (4) they are reasonable and necessary to treat an illness or injury. Physical therapy and speech therapy are covered if a physician's assessment finds these services to be necessary. Beneficiaries who need only occupational therapy are entitled to benefits only if they have established a prior need for skilled nursing care, speech therapy, or physical therapy in the current or previous certification period (see Teplitsky and Janson 1985-1992, p. VII.23, Section 204.4).

The dramatic growth in Medicare home health expenditures, combined with marked regional variations in service use and recent investigations into industry fraud and abuse, prompted Congress to legislate changes to the Medicare home health benefit as part of the Balanced Budget Act of 1997. These changes included:

- Lowering the per-visit cost limit (known as the Section 223 limits) from 112 percent of the mean to 105 percent of the median cost for freestanding agencies in the region. The Section 223 limits were frozen for reporting periods that began between July 1, 1994, and June 30, 1996.
- Defining the maximum payment for an agency by using a new algorithm that is based on annual per-beneficiary costs or per-visit costs in a base year, whichever is lower. This algorithm is commonly referred to as the Interim Payment System (IPS), because it is intended to last only until the mandated prospective payment system takes effect.
- Eliminating coverage for blood drawing when it is the only home health service required
- Redefining "part-time" and "intermittent" care
- Redefining service location on the basis of the location of the patient rather than of the agency, thus affecting the payment basis when the patient and the agency are not in the same location

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[4] These figures refer only to Medicare beneficiaries in fee-for-service.

- Requiring additional billing information (an identifier for admitting physician and visit length)

The changes in the per-visit cost limit and the algorithm for payment (the so-called IPS system) have no effect on demonstration agencies until after their participation in the demonstration has ended. However, demonstration agencies have been affected by the other changes.

First, utilization of home health services decreased dramatically due to the Balanced Budget Act of 1997. As Figure I.1 shows, the number of visits per beneficiary fell 43 percent from 1997 to 1999. Thus, the demonstration took place during a time of an unprecedented slowdown in the rise of Medicare home health services.

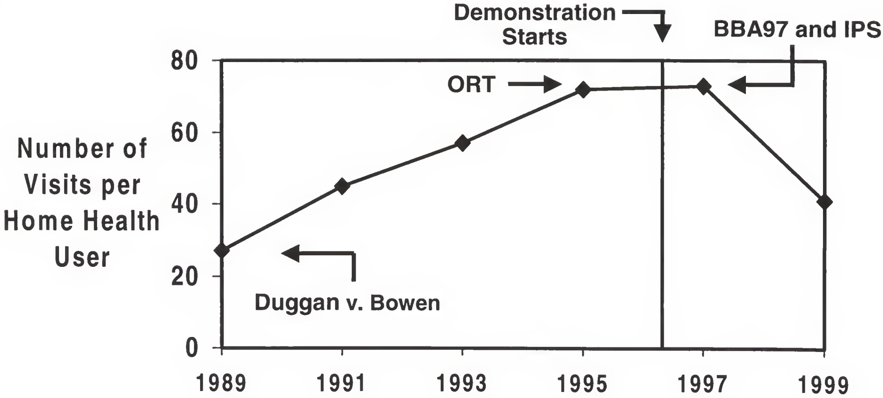
The Balanced Budget Act of 1997 also mandated the implementation of a prospective payment system for home health services. In anticipation of this new system, a number of demonstration agencies, particularly the cost-reimbursed agencies, started to reduce the number of visits per episode (Cheh et al. 2001). The agencies wanted to be in position to earn profits (or at least not lose money) when the new payment system was implemented. This new payment system was implemented in October 2000.

B. THE PER-EPISODE DEMONSTRATION

Because a cost-reimbursed payment system does not provide any mechanism that enables home health agencies to earn profits by cutting costs, these agencies have no incentives under such a system to provide services efficiently. Moreover, by reimbursing costs up to allowable limits, the system effectively subsidizes inefficient providers. The intent of per-episode prospective payment is to increase efficiency within the agencies, with the opportunity to generate profits the agencies' primary incentive to do so.

FIGURE I.1

POLICY CONTEXT



Source: Health Care Financing Administration (1999).

ORT = Operation Restore Trust.

Ninety-one Medicare-certified home health agencies in five states—California, Florida, Illinois, Massachusetts, and Texas—enrolled in the three-year per-episode demonstration. Of these, 47 were randomly assigned to the treatment group and received per-episode payment. The remaining 44 were assigned to the control group and continued to operate under cost reimbursement. One control agency subsequently transferred into the treatment group near the start of the demonstration, leading to a revised total of 48 treatment agencies and 43 control agencies.[5] Each agency entered the demonstration and began implementing prospective payment at the start of its fiscal year. The first entrants to the demonstration began implementing prospective payment in June 1995; the latest entrants began in January 1996. Demonstration operations were planned to continue through December 1998. (The demonstration was extended for treatment group agencies until prospective payment Medicare home health care was implemented nationally in October 2000.)

Mathematica Policy Research, Inc. is the contractor responsible for the process and impacts evaluation of the demonstration. Several other organizations are also participating in the demonstration. Abt Associates, Inc. is the implementation contractor responsible for recruiting demonstration agencies, monitoring the status of demonstration operations, and calculating certain statistics required to determine agency payments. Palmetto Government Benefits Administrator (PGBA) is the fiscal intermediary (FI) responsible for review of claims and agency payment for both treatment and control agencies. The Center for Health Policy Research (CHPR) at the University of Colorado is responsible for designing and implementing a quality assurance (QA) system for the demonstration agencies.

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[5] The switch was made at the request of an agency that had established a network with two other agencies assigned to the treatment group. The three agencies plan to merge fully at the end of the demonstration.

1. Demonstration Payment and Incentives

HCFA developed the Home Health Prospective Payment Demonstration to assess whether the profit motive can increase efficiency in providing Medicare home health care, thereby reducing public expenditures without sacrificing access to care or the quality of care. Phase I of the demonstration, which tested per-visit prospective rate setting, gave agencies an opportunity to generate profits (and avoid losses) by reducing per-visit costs.[6] The evaluation of Phase I found that some agencies earned profits but, because they had no incentive to limit the services they provided, did little to contain overall costs. The current phase of the demonstration, Phase II, tests a per-episode prospective payment system. This system encourages agencies to reduce their per-visit costs, and it provides the additional incentive to reduce visits per patient episode. Thus, the opportunity for cost savings is much greater under the Phase II payment system than under the Phase I system.

a. Payment

Agencies selected for the treatment group receive a lump-sum payment for the first 120 days of home health care, regardless of the number or cost of visits provided.[7] The agencies are thus "at risk" for the costs of care incurred during this period. Only after the 120-day at-risk period and after a 45-day gap in services have elapsed can an agency receive a new per-episode payment for a given

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[6] Although the per-visit demonstration was implemented in the same five states as is the per-episode demonstration, most of the agencies participating in the per-episode demonstration did not participate in the per-visit demonstration. (Only agencies in the per-visit control group were eligible to do so. For details on the results of the per-visit demonstration, see Brown et al. [1995].)

[7] Durable medical equipment, nonroutine medical supplies, and Part B ambulatory home health services continue to be reimbursed at cost throughout the demonstration. In addition, if an agency did not provide one or more of the six Medicare services during the base year but begins to do so during the demonstration, then those visits are also reimbursed at cost during the demonstration, as are the costs of care for which Medicare is a secondary payer.

Medicare beneficiary. For each visit beyond 120 days that does not begin a new episode (referred to as "the outlier period"), treatment agencies receive a fixed payment rate that varies by the type of visit. In the demonstration, a treatment agency is also paid on a per-visit basis for visits made to patients admitted before the agency began demonstration operations ("phase-in" visits), and to patients admitted within 120 days of the end of demonstration operations in that agency ("phase-out" visits).

Agencies selected for the control group receive payments based on the cost-based system in place at the start of the demonstration. Specifically, control agencies are reimbursed for their actual per-visit costs, up to 112 percent of the mean cost incurred by all agencies (for the agency's mix of visits) in the same geographic area.

b. Prospective Rate Setting

Prospective (per-episode) rates for the at-risk period are based on a treatment agency's costs and episode profile in the fiscal year preceding its entry into the demonstration (the base year), adjusted for inflation and changes in case mix in each evaluation year.[8] The episode profile is the average number of visits provided by the agency during an episode, calculated for each of the six types of visits covered by Medicare. Payments for outlier, phase-in, and phase-out visits are also based on the agency's base-year per-visit costs (adjusted for inflation).[9] HCFA's market basket is used to adjust both the per-visit and per-episode rates for inflation. Both the per-episode and per-visit payment rates were subject to HCFA's statutory home health cost limits.

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[8] For more information on payment rates under the demonstration, see Phillips et al. (1995).

[9] Because complete data for episode profiles and settled cost reports are not available for a given year until some months after that year has ended, the initial lump-sum and per-visit rates used in the demonstration were preliminary and were revised after final base-year data became available.

The case-mix adjuster classifies each patient into 1 of 18 groups on the basis of 12 variables that describe the patient's characteristics and hospital stay history. From this information, an aggregate case-mix index is created for each agency. At the end of each year of the demonstration, an agency's case-mix index for that year is compared with its case-mix index for the base quarter (the last quarter of the base year). If the agency's case mix differs from its base-quarter case mix, then its aggregate payment is retrospectively adjusted (see Appendix A for additional details).

c. Profit Sharing and Loss Sharing

To counteract the incentive to dramatically reduce services at the expense of quality, as well as to prevent agencies from realizing windfall profits at public expense, HCFA shares in any profits above selected levels. If the total of a treatment agency's per-episode payments and per-visit prospective payments is greater than the costs for services covered by these payments, then any resulting profit greater than five percent of total allowable costs for these services is subject to profit sharing. HCFA's share is 25 percent for profits between 5 and 15 percent of total allowable costs; the share increases for profit rates greater than 15 percent by an amount that varies with the demonstration year.

HCFA has provided a loss-sharing arrangement as a means of encouraging agencies to participate in the demonstration. It reimburses treatment agencies for 99 percent of losses occurring during the first demonstration year, and for 98 percent and 97 percent of losses during the second and third demonstration years, respectively, as long as total payments are within the demonstration cost limits.

2. Other Demonstration Procedures

Three other important demonstration procedures involve (1) the process of medical review, (2) the methods for billing, and (3) the requirements for QA. Treatment agencies are strongly affected by all these demonstration procedures; control agencies are principally affected by the QA requirements. In this section, we briefly discuss each procedure.

a. Medical Review

For agencies in the treatment group, PGBA conducts a limited medical review (known as an "abbreviated" medical review) of the care delivered during the at-risk period of a patient episode. This review, which is limited to the admission bill, seeks to determine whether the patient met the coverage criteria for home health care, and whether the agency provided at least one visit that met these criteria. As a condition of payment, PGBA requires the agency to submit either HCFA 485 and 486 forms (which contain information on the patient's health and eligibility status, as well as on the home health treatment plan) or clinical notes for admissions that coincide with an episode eligible for prospective payment. The medical review is based on these materials. All services paid for under per-visit rate setting are subject to the usual medical review, under which a sample of claims is reviewed to ensure that each visit is medically reasonable and necessary.

Although all episodes initially were subject to abbreviated medical review, HCFA reduced the proportion to 25 percent in May 1996. It made this change because the claims reviews took longer than expected, and because 100 percent medical review was considered unrealistic under a national program.

Medical review for control agencies continues under the current (nondemonstration) regulations. For some control agencies, however, PGBA's review procedures may differ from those of their predemonstration FIs, so that the agencies have had to adopt some minor procedural changes.

b. Billing

Treatment agencies must submit an admission bill to PGBA in order to initiate an episode of care. If a treatment admission claim is accepted (subsequent to abbreviated medical review), then the per-episode payment is provided as a lump sum.[10] Treatment agencies also must submit interim bills for services provided during the remainder of the at-risk period, although they receive payments only for supplies.[11] For services provided near the start of the outlier period, agencies must "split" its standard bill into two bills—one for services provided up to the end of the at-risk period, and one for services provided from the start of the outlier period.

When a patient is discharged during either the at-risk period or the outlier period, agencies must submit a discharge bill to terminate the episode. PGBA will not initiate a new episode for a given patient unless a previous episode has been terminated. In addition, before initiating a new episode, PGBA determines that the 120-day risk period and a 45-day gap have elapsed.

Periodic interim payments (PIPs), a means of "smoothing" cash flow for home health agencies, were originally discontinued for treatment agencies. However, a similar periodic payment system

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[10] If the admission claim is denied, interim claims for that episode are suspended for 65 days to await appeal. If an appeal is filed, interim claims are suspended until a decision on the appeal for the admission claim is made. If an admission claim is denied but an appeal is not filed within 65 days, or if the denial of the admission claim is upheld on appeal, then suspended interim claims are released for possible payment under the agency's per-visit rates.

[11] Agencies also must submit interim bills to receive payment during outlier periods, and to correctly calculate costs for profit or loss sharing with HCFA.

(termed "biweekly interim payments") was later introduced by PGBA to address cash flow problems in some agencies.

Control agencies continue to submit bills under cost-reimbursement and continue to be eligible for PIPs. PGBA bases the amount of a PIP on an agency's average cost for each type of visit. For some agencies, this method differed from the practices of their predemonstration FIs, which based the PIP on overall agency average cost per visit. The new method may have led to minor differences between the PIPs some control agencies received before the demonstration and those they received after entering it.

c. Quality Assurance

All agencies participating in the demonstration (whether in the treatment or control group) are required to collect and submit patient-specific information to CHPR, the demonstration QA contractor. The QA procedures follow a continuous quality improvement approach. Visiting staff from demonstration agencies are required to collect information (primarily on functional status and medical condition) at admission and at discharge, or 120 days after admission, whichever comes first. Similar information is also collected before admission to an inpatient facility for stays of 48 hours or longer, and on a patient's return to home health care after such an inpatient stay. CHPR uses this information to develop profiles describing patient outcomes at each agency. These profiles are given to the demonstration agencies to help them improve the quality of care they provide.

C. GUIDE TO THE REST OF THIS REPORT

The next chapter of this report describes the data sources, samples, and variables used to examine agency finances under the demonstration, as well as statistical methods used to measure demonstration impacts. In Chapter III, we present our hypotheses and findings from an analysis of demonstration impacts on agency costs, profits, and revenues. Chapter IV presents demonstration impacts for specific agency subgroups. In Chapter V, we summarize the key findings and present our conclusions.

II. DATA, SAMPLES, AND METHODS

We estimated program impacts on measures of profits, revenues, cost per episode, cost per visit, and length of visit. To do this, we used primarily agency-level data on treatment-control group differences in the change in average outcome between the demonstration and predemonstration periods. In cases where we did not have predemonstration measures, we estimated impacts as treatment-control differences, using regression analysis.

We begin this chapter by describing the primary source of data for many of these measures: home health agency cost reports. We then describe other sources of data used for measuring outcomes and present information on control variables used in the analysis. Finally, we describe our methods and discuss how we estimated impacts from our regression analyses.

A. DATA AND SAMPLES

The Medicare cost reports that the demonstration agencies filed were the primary source of information used in this analysis. In addition, to conduct the analysis of the cost per episode, we combined Medicare claims data with the information from the cost reports.

1. Cost Report Data

The primary data source for the analysis of profits, revenues, and cost per visit consisted of the Medicare cost reports filed by the 88 participating agencies participating in the demonstration. We requested cost reports for the three years preceding the demonstration, and for the three years of the demonstration—a total of six years. The demonstration-period cost reports for the treatment group members have been split into two parts; the first part contains most of the information usually contained in a typical cost report, and the second contains special information needed to calculate demonstration-specific profit and loss rates. Because PGBA completed the second part after tentative settlement, the second part for the third demonstration year was unavailable for many treatment agencies at the time we requested the data. Although our final data set contains six years of data for most agencies, information for some years for some agencies was missing. These are documented in Table II.1.

2. Exclusion of Agencies

Any one of three factors constituted a basis for excluding all of an agency's data from the analysis. First, three agencies dropped out of the demonstration during the first demonstration year. Second, we dropped seven agencies because they failed to submit complete bills during the demonstration.[1] We had to take this step because the number of visits reported on an agency's cost report must correspond to the number of visits billed to Medicare. (If agencies fail to bill for all visits, the cost per visit will be artificially high.) Finally, one agency, which was too small, reported no episodes of care during the demonstration period. We therefore excluded 11 agencies from the analysis (8 in the treatment group and 3 in the control group), leaving 80 agencies (40 treatment and 40 control group agencies). Six agencies dropped out of the demonstration during its final year. We retained all six years of data for one of these six agencies.[2] For the remaining five agencies, we dropped only the final year's data because the agencies had provided legitimate data during prior years.

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[1] One of the agencies that a previous analysis, by Trenholm (2000a), had diagnosed as having billing problems subsequently corrected the problems and submitted a complete claims file for the three demonstration years. For the current report, we again included this agency's data in the analysis file.

[2] This agency dropped out two months before completion of the demonstration. This agency had a complete record of billing data and a sufficient number of visits to enable us to use information on its admissions and visits for the first six months (rather than eight months) of its third demonstration year.

TABLE II.1

NUMBER OF AGENCIES PROVIDING DATA, BY DEMONSTRATION YEAR

	Three Years Predemonstration	Two Years Predemonstration	Base Year	First Demonstration Year	Second Demonstration Year	Third Demonstration Year
Number of Agencies Recruited	91	91	91	91	91	91
Number of Participating Agencies at End of Demonstration Year	88	88	88	88	88	82
Number of Agencies Providing a Medicare Cost Report	83[a]	88	88	88	88	83[b]
Number of Agencies Providing a Medicare Cost Report and Included in the Analysis[c]	76	80	80	80	80	75[c]
Number of Hospital-Based Agencies Providing a Medicare Cost Report in the Analysis[d]	9	9	9	9	9	9
Number of Agencies Having a Settlement Report at the Time of Analysis[e]	NA	NA	NA	39	36	23

NOTE: Because of missing pages of cost reports or changes in services offered, the number of observations for each outcome variable varies. For example, 70 agencies submitted complete data for all six years on skilled nursing costs, 70 on home health aide costs, 69 on physical therapy costs, 57 on occupational therapy costs, 58 on speech therapy costs, and 66 on medical social worker costs. The number of observations is noted in each table separately. Settlement reports are only provided for treatment agencies.

[a] Five agencies could not provide a cost report for the full three years prior to the demonstration.

[b] One agency who dropped from the demonstration provided a cost report and was included in the analysis since it participated for six of the eight months.

[c] Eight agencies that provided a Medicare cost report were excluded from the analysis; seven of which failed to submit complete bills during their demonstration and one that had no episodes.

[d] Data on total profits and total revenues are unavailable for hospital-based agencies.

[e] Settlement reports are only relevant for treatment agencies.

NA = not available.

3. Episode Construction

To calculate a cost per episode, we had to construct an episode of care from Medicare claims data. To do so, we:

- Identified the episode start and end dates, using UB92 data
- Matched the episode dates from the UB92 data to the Medicare Standard Analytical File (SAF), to create the service use measures
- Matched the episodes to other Medicare files, to obtain data for control variables

The following sections describe how and why we took each step.

a. Identifying Episodes

We used data from UB-92 bill record files obtained from the demonstration fiscal intermediary, PGBA, to identify home health episodes for patients of both treatment and control agencies, as defined by demonstration rules. We used UB92 data to define our episode dates because they contained patient-level control variables necessary for other analyses (see Trenholm 2000a).

To construct episode "begin" and "end" dates, we started with each agency's enrollment date in the demonstration and scanned the UB-92 files to identify both the first admission for each individual and all subsequent bill records for that person. We included all records for an individual for 120 days after the first admission and any bills for care after 120 days until we observed a gap of at least 45 days' length in billing dates. We followed this procedure regardless of whether the agency discharged and readmitted a patient during the 165 (120 + 45) days. If we observed a readmission for a patient after day 165, and if a 45-day gap in care had taken place, we created another record for the patient corresponding to the second episode. We repeated the process until we had constructed all episodes for the three demonstration years.[3]

b. Matching to Medicare Claims for Outcomes Variables

After we established the begin and end dates of the episode, we matched the episodes to HCFA's Medicare SAFs, to obtain measures of service use. Fewer than one percent of the episodes did not match to the SAF records. We used the SAF data to construct service use measures, rather than the UB-92 data, because HCFA adjusts only the SAF data for any voided or amended bills. Hence, the SAF data provide a more accurate measure of the services for which HCFA pays. In addition, because any measures of service use from the predemonstration period would use the Medicare SAFs, we had to be sure that the same adjustment algorithms were applied in all periods.

We used both Part A and Part B claims because the payment rules changed during the final year of the demonstration, and visits that had previously been paid under Part A were now paid under Part B. Since we would not be able to identify with certainty which of the final year Part B claims would have been paid in previous years under Part A (versus those that would have been paid under Part B), we opted to include all Part A and Part B claims over all years, in order to have consistent measures over time.

c. Matching to Medicare Files for Control Variables

After constructing our home health outcomes, we attached patient demographic variables to each episode to use as control variables in selected regressions. We obtained these patient characteristics, which consist of age, race, gender, and the initial reason for entitlement, from the enrollment database.

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[3] We excluded episodes beginning after the last day of the eighth month of year 3, as agencies began phasing out of the demonstration at that point. Later, HCFA decided that treatment agencies would remain in the demonstration, even though the control agencies were phased out. For consistency, therefore, all episodes after that point were excluded.

d. Excluding Episodes

We dropped a number of records from the analysis file before aggregating to generate agency-level cost-per episode. First, we dropped the 21,918 admissions from the 11 excluded agencies and six excluded agency years specified in Section II.A.2. We also dropped 10,992 patient records because HCFA's enrollment files showed that the patients had been enrolled in Medicare HMOs on or after the episode start date. It would have been inappropriate to include these records because the services provided to managed care patients are not subject to prospective payment (or to traditional cost reimbursement). We dropped 6,309 patient records because Medicare was a secondary payer for the patient on or after the episode start date. As with managed care patients, the services provided to these patients are not subject to per-episode payment; thus, the behavior of the agencies in these cases would have been largely independent of the demonstration incentives. Finally, we excluded 3,137 patients without record of any home health visits during the first month of care. This would indicate that Medicare funds had been used to purchase medical equipment for the beneficiary, a benefit not directly affected by the demonstration. Table II.2 details the individual records excluded from the analyses.[4]

e. Analysis Sample

After dropping the inappropriate records, we had a file that contained 179,766 unique patient admissions (87,330 in the control group and 92,436 in the treatment group). The sample available

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[4] One agency's fiscal year changed after it was bought out by a hospital, causing its demonstration to last longer than three years. This agency therefore has 39 months of episode-level demonstration data.

TABLE II.2

PATIENT ADMISSIONS RECORDS EXCLUDED FROM THE ANALYSIS SAMPLE, BY TREATMENT STATUS

	Base Year		Year 1		Year 2		Year 3		Total	
	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control	Treatment
Main File[a]	25,244	28,704	33,248	37,064	27,776	32,103	17,095	20,888	103,363	118,759
Agency-Level Exclusions										
Dropped Out of Demonstration in Year 1	1,151	191	1,916	293	56	55	0	0	3,123	539
Missing Bill Data	1,227	4,170	852	4,734	700	3,713	292	2,221	3,071	14,838
Agency Too Small	0	20	0	13	0	10	0	2	0	45
Dropped Out of Demonstration in Year 6	NA	NA	NA	NA	NA	NA	293	9	293	9
Patient-Level Exclusions										
Enrolled in HMO	474	605	2,329	2,627	1,883	1,680	641	753	5,327	5,665
Has Medicare as Second Payer	613	694	990	1,073	909	966	534	530	3,046	3,263
No Home Health Visits in Month 1	1	1	302	406	270	690	600	867	1,173	1,964
Sample Available for Analysis	**21,778**	**23,023**	**26,859**	**27,918**	**23,958**	**24,989**	**14,735**	**16,506**	**87,330**	**92,436**

[a] All demonstration admissions through August 31, 1998.

HMO = health maintenance organization; NA = not available.

for analysis decreases over the three years of the demonstration in both the treatment and control group (see Table II.2). There were 44,801 admissions in the base year, 54,777 admissions in demonstration period year 1, 48,947 in year 2, and 31,241 in year 3. Even before we began to exclude data at either the agency or the patient level, the raw data file showed that admissions had decreased substantially over the course of the demonstration.[5] This decline, which affects both the control group and the treatment group, reflects the exclusion of patients who phased in and phased out of the demonstration, as well as the decline in admissions due to Operation Restore Trust and the growth of managed care in some areas.

f. Aggregating Episode Data to Agency-Level Analysis

In the final step, we aggregated the data on individual episodes to the agency level. We used the same process to aggregate the episodes for the predemonstration period and for the demonstration periods. First, we created an individual cost per episode by multiplying the number of visits of each of the six types during the 120-day period by the cost per visit of that type for the agency delivering the episode.[6] We used base-year costs per visit to create the cost per episode for the base year, first- year costs per visit to create the cost per episode for the first demonstration year, and so forth. We summed the products across the six visit types. We then averaged these individual episode costs for each agency to obtain an agency-level cost per episode.

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[5] Before exclusions were made, the main data file contained 53,948 admission in the base year, 70,312 admissions in year 1, 59,879 in year 2, and 37,983 admissions in year 3.

[6] Cost per visit is taken from Worksheet C of each agency's cost report.

4. Time Sheet Survey

The cost reports do not include one important component of cost—the time of the visits. To capture this information, we collected time sheet survey data from the agencies in the demonstration, by asking them to provide these data for a sample of their nurses and aides on a single day. In some cases, these data were available from automated data sources; in others, agency staff completed a time sheet on the specified day, documenting the length of each visit. A total of 45 treatment agencies and 41 control agencies provided data on 5,932 skilled nursing visits (2,843 control and 3,089 treatment visits) and 6,362 home health aide visits (3,863 and 2,499, respectively). We aggregated these data to the agency level to obtain an agency average for a skilled nursing visit and for a home health aide visit.

The time sheet data have a key drawback relative to the other data. Because they are available only in the postdemonstration period, we can compare the treatment and control agencies, but we cannot observe how the treatment and control agencies changed from the predemonstration period to the demonstration period. Nevertheless, no other data are available to examine this important issue.

5. Agency Analysis Sample

The analysis sample for the cost analysis consists of data on profits, revenues, and cost per visit taken from agency-level cost reports and cost per episode data from a combination of cost report and claims data. After excluding agencies meeting the criteria discussed in Section II.A.2, we dropped agencies for a particular outcome for one of two reasons.[7] First, we dropped data for an agency's outcome if all the data for either the predemonstration or the demonstration period were missing.

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[7] As a result of this exclusion process, the size of the analysis sample varies for different agency-level outcomes.

As a result, we dropped five agencies for the analysis of total revenue, two for Medicare visit revenue, and five for total profit. Second, we excluded agencies from the analysis of cost per visit if they did not provide a particular type of home health visit during the base year (one year before the demonstration); that type of visit would not have been included in the calculation of the agency's per episode payment. Furthermore, we cannot measure the impact on those visits, as we usually have no predemonstration observations.[8] This step led to the exclusion of three agencies from the analysis of the cost of physical therapy home health visits, seven from the analysis for occupational therapy, seven for speech pathology, and three for medical social work. The agency analysis sample consists of 40 treatment and 40 control agencies, but the number of observations for a given outcome varies due to the aforementioned exclusions and agency characteristics.[9]

B. OUTCOME AND CONTROL VARIABLES

1. Outcome Variables

We used five major outcomes in this report: (1) profits, (2) revenues, (3) cost per episode, (4) cost per visit, and (5) length of visit. Table II.3 lists the individual variables and their sources. Two of these outcomes—agency revenues and cost per visit--are available for three years prior to the demonstration and three years after the demonstration, for a total of six years. The cost per episode variable is available for one year prior to the demonstration and three years during the demonstration, for a total of four years. Total agency profits are available for six years, but Medicare

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[8] In a few cases, we had cost data from two years prior to the demonstration, but not from the base year (because the agency dropped the service). They typically added the service again (in Year 2 of the demonstration or later). Since these services were reimbursed on a cost basis (not at a predetermined rate), we excluded these observations.

[9] For example, total revenue and total profit are available only for the 71 freestanding agencies in the sample.

TABLE II.3

SOURCES OF DATA FOR OUTCOME VARIABLES

Variable	Years Available	Treatment	Control
Medicare Profit	3	Allowable profit from modified Worksheet D	NA
Total Profit	6	Line 33; Worksheet F1	Line 33, Worksheet F1
Medicare Visit Revenues	6	Payment; Worksheet D	Lesser of total program cost or total program cost limits (Worksheet C)
Total Revenues	6	Net patient revenues plus total other income, Worksheet F1	Net patient revenues plus other total income, Worksheet F1
Cost per Visit	6	Worksheet C	Worksheet C
Cost per Episode	4	Cost per visit multiplied by number of visits (claims data)	Cost per visit multiplied by number of visits (claims data)
Length of Visit	1	Time sheet survey	Time sheet survey

NOTE: Predemonstration treatment group variables are the same as control group variables.

NA = not available.

profit is only relevant in the three demonstration years for the treatment agencies.[10] Finally, the length of visit is a one day snapshot at each agency.

Because we are using fixed-effects models that compare each agency with its own base-period status, we do not need to use control variables unless differences across agencies vary over time. The method eliminates the effects of time-invariant preexisting differences between treatment and control variables by comparing the *change* in the dependent variable for these two groups by using an agency indicator variable to control for agency-specific effects. However, the demonstration may affect a given outcome both directly and indirectly. That is, in addition to directly affecting costs (for example, by encouraging staff to complete more visits per day), the demonstration may also affect agencies' volume of services, which, in turn, may affect cost per visit and cost per episode. With models controlling for changes in volume and patient characteristics (by including the level of volume and patient characteristics), the treatment status variable will measure only the direct effects of the payment method. By using models that exclude these variables, we estimate the total effects of the demonstration.

2. Control Variables for the Analysis of the Length of Visit

Because we do not have pre demonstration data for the length of stay, we included agency characteristics in our regressions to control for agency differences and note differences that might affect the length of a home health visit. Using these control variables is important; as we have seen in other reports, there are some differences in the agency characteristics, despite random assignment (Cheh and Trenholm 1999). Table II.4 lists the variables that we controlled for.

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[10] By definition, agencies can not earn profits under cost reimbursement.

TABLE II.4

LIST OF CONTROL VARIABLES IN REGRESSIONS ON LENGTH OF VISIT

Treatment Status
Whether Agency Is a Member of a Chain
Agency Practice Pattern and Index
Whether Agency Is For Profit
Whether Agency Is Hospital-Based
Whether Agency Has Fewer than 30,000 Medicare Visits in Base Year
Whether Agency Is in an Urban Area
Whether Agency Is in:[a]
Florida
Illinois
Massachusetts
Texas

[a] Agencies in California are the reference group.

C. ANALYTIC METHODS

To reflect the focus of our analysis, which is the agency-level response to the per-episode demonstration, we make the agency the unit of observation and use fixed-effects models to compute demonstration impacts. The fixed-effects model calculates the demonstration impact as the mean difference between treatment and control agencies in the change in outcomes between the predemonstration and demonstration periods. For example, assume that the average change in cost per episode from the predemonstration period to the demonstration period was $200 for treatment agencies and $400 for control agencies. The only factor that differed between treatment and control agencies over this period was their form of payment, so the difference in the cost-per-episode growth, - $200, reflects the (average) impact of the demonstration among participating agencies. The fixed-effects approach is especially desirable because it controls for *all* fixed factors by taking the difference of outcomes between periods.

1. Fixed-Effects Models

Operationally, the basic (or unadjusted) fixed-effects model is identical to an ordinary least squares regression with an agency-specific constant term, binary indicators of time, and interactions of time and treatment status. The specific model is as follows:

$$(1) \qquad Y_{in} = \alpha_i A_i + \sum_{(n=1,\ n\neq 3)}^{6} \beta_n YR_n + \sum_{(n=1,\ n\neq 3)}^{6} \gamma_n (T * YR_n) + \varepsilon_{in},$$

where:

Y is the agency-level dependent variable (total revenue, total profit, cost per visit, cost per episode)

T is a binary variable indicating the agency's treatment status that equals 1 for treatment agencies and equals 0 for control agencies

YR_n is a binary variable that equals 1 for observations from year n for $n = 1, 2, 4, 5$, and 6 for the six-year period covered by the analysis and equals 0 otherwise[11]

A_i is an agency-specific binary variable that equals 1 if an observation pertains to the ith agency and equals 0 otherwise

α_i, β_n, and γ_n are the parameters to be estimated

ε is a random disturbance term.

Effects of the demonstration intervention were computed from coefficients on the treatment-status/year interaction terms. Specifically, the impact in any of the demonstration years was calculated as the treatment-control difference for that year net of the average treatment-control difference during the predemonstration period. We calculated this difference from the coefficients in equation (1) as follows:

$$\text{(2)} \quad \begin{aligned} &\textit{Impact for year 4} = [\gamma_4 - (\gamma_1 + \gamma_2)]/3 \\ &\textit{Impact for year 5} = [\gamma_5 - (\gamma_1 + \gamma_2)]/3 \\ &\textit{Impact for year 6} = [\gamma_6 - (\gamma_1 + \gamma_2)]/3. \end{aligned}$$

To calculate the average impact per year during the three demonstration years, we used a similar equation:

$$\text{(3)} \quad \textit{Average annual impact, years 4-6} = [(\gamma_4 + \gamma_5 + \gamma_6)/3] - [(\gamma_1 + \gamma_2)/3].^{12}$$

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[11] Years 1, 2, and 3 correspond to the three predemonstration years, with year 3 being the base year. Years 4, 5, and 6 correspond to the three years of demonstration operations. The terms pertaining to year 3 were omitted to avoid making the independent variables collinear. We use the same approach when we only have four years of data.

[12] For a treatment agency, the average estimate in the predemonstration period is $[(\alpha_i + \beta_1 + \gamma_1) + (\alpha_i + \beta_2 + \gamma_2) + \alpha_i]/3$. In the demonstration period it is $[(\alpha_i + \beta_4 + \gamma_4) + (\alpha_i + \beta_5 + \gamma_5) + (\alpha_i + \beta_6 + \gamma_6)]/3$. So the average change for treatment agencies is $[(\beta_4 + \gamma_4) + (\beta_5 + \gamma_5) + (\beta_6 + \gamma_6)]/3 - [(\beta_1 + \gamma_1) + (\beta_2 + \gamma_2)]/3$. For the control agency, the average estimate in the predemonstration period is $[(\alpha_i + \beta_1) + (\alpha_i + \beta_2) + \alpha_i]/3$. In the demonstration period, it is $[(\alpha_i + \beta_4) + (\alpha_i + \beta_5) + (\alpha_i + \beta_6)]/3$. So the average change for the control agencies is $(\beta_4 + \beta_5 + \beta_6)/3 - (\beta_1 + \beta_2)/3$. Subtracting the average change for the controls from the average change for the treatments leaves you with $(\gamma_4 + \gamma_5 + \gamma_6)/3 - (\gamma_1 + \gamma_2)/3$.

The estimated impacts in equations (2) or (3) were statistically significant if an *F*-test indicated that the linear combinations of the coefficients were significantly different from zero.

The essential statistical assumption underlying equation (1) is that no unobserved factors that are correlated with an agency's demonstration status also affect the outcome of interest. If this assumption is violated, the estimated demonstration impact from this simple fixed-effects specification *may* be biased. Fortunately, two factors greatly reduce the possibility of such bias. The first is the random assignment of agencies into the treatment and control groups, which greatly reduces the likelihood of unobservables being correlated with treatment status. The second is the specification of the model, which nets out the influence of any fixed factors that might be correlated with treatment status.

A principal weakness of the simple fixed-effects model is that it cannot account for agency-level factors that may change over time. If these factors are correlated with agencies' treatment status and have a significant impact on our outcome of interest, the estimated demonstration impacts may be biased. The most important factors that fit these criteria are agency-level patient characteristics and the volume of service provision. Incorporating this factor into equation (1) produces the following "regression-adjusted" fixed-effects model:

$$(4) \quad Y_{in} = \alpha_i A_i + \sum_{(n=1,\ n\neq 3)}^{6} \beta_n YR_n + \sum_{(n=1,\ n\neq 3)}^{6} \gamma_n^{*}(T * YR_n) + X\theta + \varepsilon_{in},$$

where:

Y is the agency-level dependent variable (total revenue, total profit, cost per visit, cost per episode)

X is a vector of patient- and/or agency-level characteristics (for example, volume) that may change over time and that may be correlated with the agency's treatment status

T is a binary variable indicating the agency's treatment status that equals 1 for treatment agencies and 0 for control agencies

YR_n is a binary variable that equals 1 for observations from year n where $n = 1, 2, 4, 5$, and 6 for the six-year period covered by the analysis and equals 0 otherwise[13]

A_i is a set of agency-specific binary variables that equal 1 if an observation pertains to the ith agency and equals 0 otherwise

α_i, β_n, γ_n, and θ are the parameters to be estimated

ε_{in} is a random disturbance term for agency i at time n.

As in equation (1), the impact of the demonstration in equation (5) is calculated from the coefficients in equation (1) as follows:

(5) $$\begin{aligned} &\textit{Impact for year 4} = \gamma^*_4 - (\gamma^*_1 + \gamma^*_2)/3 \\ &\textit{Impact for year 5} = \gamma^*_5 - (\gamma^*_1 + \gamma^*_2)/3 \\ &\textit{Impact for year 6} = \gamma^*_6 - (\gamma^*_1 + \gamma^*_2)/3. \end{aligned}$$

(6) $$\textit{Average annual impact, years 4-6} = [(\gamma^*_4 + \gamma^*_5 + \gamma^*_6)/3] - [(\gamma^*_1 + \gamma^*_2)/3].$$

The estimated impacts were statistically significant if an F-test indicated that the linear combinations in (5) or (6) were significantly different from zero.

Because the demonstration may *directly* affect both patient characteristics and service volume, differences in estimated demonstration impacts when controlling and not controlling for these factors do not necessarily suggest that our "unadjusted" impacts are biased. Instead, they may indicate that the demonstration impact is operating indirectly through its influence on patient mix or service volume. For example, assume we find an impact of the demonstration on cost per visit, but that the estimated impact is much less after we control for variation in service volume. This may suggest that the estimate from the unadjusted model is biased. However, it is more likely that a large portion of the increase in cost per visit resulting from the demonstration is due to lost economies of scale as treatment agencies reduced visits per episode. That is, in response to the demonstration, agencies reduced their visits per episode, which resulted in declines in overall agency volume and increases in costs per visit. To control for the demonstration effect, one can estimate the model given by equation (4) while including agency-level patient characteristics and service volume in the vector X. All else equal, the larger the impact of the demonstration on these variables, the more the change in the direct impact may be attributed to indirect demonstration effects operating through changes in volume and patient mix.[14]

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[13] Years 1, 2, and 3 correspond to the three predemonstration years, with year 3 being the base year. Years 4, 5, and 6 correspond to the three years of demonstration operations. The terms pertaining to year 3 were omitted to avoid making the independent variables collinear.

An additional weakness of the simple fixed-effects model is that it does not allow for the possibility that the outcome may differ across agencies depending on the agencies' fixed characteristics. If these characteristics are also correlated with agencies' treatment status, our estimates of demonstration impacts may be biased. In principle, controlling for these factors is straightforward: the regression-adjusted fixed-effects model shown in equation (4) is simply refined to include a set of fixed agency characteristics as control variables. However, this model itself is limited because it cannot determine whether agencies with different characteristics have different levels of change in outcomes in general (for example, for-profit plans exhibit greater changes in cost per visit than do nonprofit ones) or have different levels of change in response to the demonstration (for example, for-profit treatment agencies respond more strongly to the demonstration but would otherwise have the same time trend as do nonprofits ones). We performed subgroup analysis to account for these possibilities.

2. Subgroup Analysis

We had three reasons for investigating demonstration impacts on agency subgroups. First, to the extent that we find such impacts of per-episode payment, we are interested in whether they differ between subgroups of agencies defined by profit status and other important characteristics. Second, if we find no overall impacts, we wish to determine whether selected types of agencies did have impacts. Third, because our main impact estimate incorporates both agency subgroup treatment effects and the overall treatment effects, it is important to investigate if these results are driven by any particular subgroup. If different subgroups had very different responses to the demonstration incentives, we might have a different interpretation for the overall impact estimate.

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[14] The direct impact is simply the calculated impact from the simple fixed-effects model in equation (1) minus that for the "regression-adjusted" model in equation (4).

When fixed-effects models are used, the analysis of agency subgroups is performed by estimating the following regression model:

$$(7)\quad Y_{inp} = \alpha_i A_i + \sum_{(n=1,n=3)}^{6} \beta_n YR_n + \sum_{(n=1,n=3)}^{6} \gamma_n (T*YR_n) + \sum_{(n=1,n=3)}^{6} \varphi_p (S_p*YR_n) + \sum_{(n=1,n=3)}^{6} \delta_p (T*S_p YR_n) + \varepsilon_{in}$$

where:

Y is the agency-level dependent variable (total revenue, total profit, cost per visit, cost per episode)

T is a binary variable indicating the treatment status of the agency that equals 1 for treatment agencies and 0 for control agencies

S_p is an indicator variable for the pth subgroup that equals 1 if the agency has the characteristic and 0 otherwise

YR_n is a binary variable that equals 1 for observations from year n for $n = 1, 2, 4, 5$, and 6 for the six-year period covered by the analysis and equals 0 otherwise[15]

A_i is an agency-specific binary variable that equals 1 if an observation pertains to the ith agency and equals 0 otherwise

α_i, β_n, γ_n, φ_p, and δ_p are the parameters to be estimated

ε is a random disturbance term.

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[15] Years 1, 2, and 3 correspond to the three predemonstration years, with year 3 being the base year. Years 4, 5, and 6 correspond to the three years of demonstration operations. The terms pertaining to year 3 were omitted to avoid making the independent variables collinear.

Because of the limited number of observations (agencies) available under the fixed-effects approach, we conducted the subgroup analysis by estimating equation (7) for one subgroup at a time. We assessed whether the demonstration impacts differed between particular subgroups by examining the statistical significance of the following impacts, calculated using coefficients from equation (7):

$$\text{(8)} \quad \textit{Average annual impact } (S_p = 0)\textit{, years 4-6} = [(\gamma_4 + \gamma_5 + \gamma_6)/3] - [(\gamma_1 + \gamma_2)/3].$$

$$\text{(9)} \quad \textit{Average annual impact } (S_p = 1)\textit{, years 4-6} = [(\gamma_4 + \gamma_5 + \gamma_6)/3] - [(\gamma_1 + \gamma_2)/3] + [(\delta_4 + \delta_5 + \delta_6)/3] - [(\delta_1 + \delta_2)/3].$$

$$\text{(10)} \quad \textit{Subgroup difference in average annual impact, years 4-6 } [(8) - (7)] = [(\delta_4 + \delta_5 + \delta_6)/3] - [(\delta_1 + \delta_2)/3].$$

An F-test of the significance of equation (10) indicates that, for the selected outcome of interest, the effect of prospective payment differs significantly between two groups of agencies (for example, for profits and nonprofits). We also tested whether the effect of the payment method is significantly from zero for each subgroup, by using the results from equations (8) and (9) respectively.[16]

3. Hypothesis Tests for the Impact Estimates

For each of the outcomes that we investigated, a t-statistic tests the null hypothesis that there is no difference between the (regression-adjusted) means for treatment and control agencies.[17] For example, when we determine whether prospective payment had an impact on revenue, we really are testing whether the mean change in revenue for treatment agencies was different from the mean change in revenue for control agencies. The associated P-value of less than 0.10 indicates rejection of the null hypothesis and provides significant statistical evidence that a demonstration impact exists. At this *P*-value, however, approximately 10 percent of independent tests will be significant when there is no true difference (known as type I error). Therefore, in assigning validity to any statistically significant impact, we must consider with care whether the sign and magnitude of the predicted effect are consistent with related outcomes.

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[16] It may not be possible to identify relatively small impacts for subgroups, because tests of statistical significance lose power as the sample size declines. The smaller the size of the subgroup (all else equal), the less likely we are to reject the hypothesis that the payment method has no effect, for a true effect of any size.

[17] When the hypothesis test involves a linear combination of variables, we use an F-test to test for demonstration impacts.

Despite the relatively large number of agencies in the demonstration, the statistical precision provided by the fixed-effects models makes it likely that we would detect only fairly large demonstration impacts on cost per episode and other outcomes at the agency level. For example, the minimum detectable effect of the demonstration on the cost per episode in the agency-level analysis is about 10.5 percent of the average predicted mean for all agencies under a two-tailed test at the 10 percent significance level, with 80 percent power (see Table II.5). This percentage reflects a demonstration impact in cost per episode of about $341 between the predemonstration and demonstration periods.

Table II.5 shows the minimal detectable differences for different outcomes used in this report. The table demonstrates that, for some important outcomes, such as net agency revenues and total revenues, the natural variation in outcomes makes it unlikely that we will detect significant impacts. However, for other outcomes, the minimal detectable different is much smaller, and we are likely to detect reasonably sized impacts, if they exist.

4. Robustness

Although we expected the regression models used in the main analysis to be robust, they may have been sensitive to two important factors. First, the general existence of outliers, either within or across agencies, may have unduly influenced our findings. Second, several agencies merged or

TABLE II.5

MINIMAL DETECTABLE EFFECTS FOR AGENCY-LEVEL ANALYSIS

	Minimal Detectable Difference[a]	Predicted Mean Without Intervention[b]
Cost per Episode (All Episodes)	340.59	3,233
Cost per Episode (First Episodes Only)	348.35	3,182
Cost per Episode (Second or Later Episodes Only)	776.91	3,475
Skilled Nursing Cost per Visit	7.43	93.91
Home Health Aide Cost per Visit	3.36	41.24
Total Revenues (in thousands of dollars)	2,406	8,401
Total Medicare Home Health Revenues (in thousands of dollars)	670	4,451
Net Agency Revenues (Total Profits) (in thousands of dollars)	455	65

[a] Minimum detectable effects are calculated for one-tailed tests at the five percent significance level for a power of 80 percent: *MDD = 2.487 * sqrt (VAR)*, where the variance is based on a given dependent variable's estimate of the average impact of the demonstration.

[b] Predicted means are regression-adjusted estimates of the average value of each variable in the absence of the demonstration.

were sold to other entities toward the end or shortly after the demonstration. Because they knew that the agency was about to cease existing, the providers may have behaved quite differently than they otherwise would have. Thus, their data may have been technically accurate but failed to reflect the agencies' true costs of care, as patients were being switched from one provider to another. Third, as noted, a number of agencies had difficulty submitting bills during the initial months of the demonstration. The agencies remaining in our analysis have confirmed that these difficulties were unrelated to the payment method, but we would like to examine whether exclusion of these agencies affected our principal results.

To address these issues, we conducted three robustness tests. First, we investigated the effects of outliers by reestimating the models without the agencies with the two highest and the two lowest agency-year values in the control group and the treatment group for a given outcome. The removal of these outlier agencies left approximately 90 percent of the sample intact.[18] To the extent that the results using this "trimmed" sample were similar to those using the full sample, our impact estimates were robust to the influence of the most extreme outliers. Second, to examine the effect of agencies that merged or were planning to do so, we examined the effect of excluding agencies identified during our site visits as intending to close or merge. Finally, we analyzed the effect of the billing problem by including agencies that we previously had excluded due to reported billing problems.

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[18] An agency that submitted cost reports in all predemonstration and demonstration years has six agency-years of data. Therefore, more than one outlier value for a given outcome may belong to the same agency. In this case, fewer than eight agencies may be dropped when the agencies containing the two highest and two lowest values in both the treatment and control groups are excluded.

III. HOW DID PROSPECTIVE PAYMENT AFFECT AGENCY FINANCES?

The prospective payment system is a fundamentally different approach to agency payment. Under cost-reimbursement, agencies had the incentive to have as much of their operating costs covered by Medicare as possible, and was only limited by the cost caps. As they increased the portion of total operating costs that were covered by Medicare, they also increased their chances of earning profits in areas of their business that were not cost-reimbursed. Under prospective payment, however, agencies can earn profits on Medicare patients, so they have an incentive to reduce the costs of Medicare patients by whatever means they believe is feasible. This fundamental change in incentives is expected to affect agency costs and profitability, as well as the amount Medicare pays for services.

A. IMPACT ON COST PER EPISODE

The demonstration payment method gave agencies a clear incentive to reduce the costs of care during the first 120 days of care. If prospectively paid agencies reduced their costs per episode below their base-period level, they kept the profit earned for that episode. In contrast, with the exception of the limited incentive to keep cost per visit below the limits, cost-reimbursed agencies have no financial incentive to reduce this cost per episode.[1]

The prospectively paid agencies significantly reduced their cost per episode. Over the course of the demonstration, an episode of care cost $457 less under prospective payment than it would have under cost reimbursement—a 14 percent savings (see Table III.I). The impact reflects two opposing trends. Among the prospectively paid agencies, the cost per episode decreased from $3,081 in the base year, to $2,728 in year 1, $2,711 in year 2, and $2,634 in year 3 (see Figure III.1).[2] In contrast, the control agencies' cost per episode generally increased, from $3,239 in the base period, to $3,291 in year 1, $3,186 in year 2, and $3,494 in year 3. Thus, for example, our impact estimate of $405 in year 1 reflects both the savings from the reduction by the prospectively paid agencies and the increase that occurred among the control agencies [($3,081 - $2,728) - ($3,239 - $3,292) = $405.[3]]

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[1] During the demonstration, the Balanced Budget Act of 1997 introduced a new payment system for home health agencies nationwide that financially penalized agencies if they provided more visits per beneficiary than they had in 1994. The control agencies in the demonstration were waived from this provision.

We anticipated that prospectively paid agencies in the demonstration would control their cost per episode better over time, and that, assuming the behavior of the cost-reimbursed agencies remained unchanged, the impacts would increase over the course of the demonstration. However, although the prospectively paid agencies slightly reduced their cost per episode in each year of the demonstration, the cost-reimbursed agencies' cost per episode varied over the demonstration—increasing relative to the base year in some periods, and decreasing in others (Figure III.1). As a result, we have no evidence that the impact on cost per episode changed over time.

Agencies also can reduce their per-episode costs by admitting patients who are less costly to care for, relative to the average patient in their case-mix group. Agencies that admit more healthier patients—or avoid the relatively sicker (and more costly) ones—will be able to lower their cost per

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[2] Because we have fewer agencies in the latter years of the demonstration, the differences across years are not strictly comparable. However, these trends are evident even with a consistent sample of agencies over time.

[3] Note that this calculation will not work in year 3 because some agency observations are missing. If one recalculated the base year mean and used only the agencies that had three full years of data, the calculation would give us the impact shown in Table III.1. This difference is also the reason the average impact cannot be calculated directly from the means in Figure III.1.

TABLE III.1

IMPACTS OF PROSPECTIVE PAYMENT ON COST PER EPISODE

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Cost per Episode (All Episodes) (n = 314)	-457* (.00)	3,233	-405* (.02)	3,212	-318 (.06)	3,107	-649* (.00)	3,391
Cost per Episode (First Episodes Only) (n = 314)	-411* (.00)	3,182	-399* (.02)	3,208	-284 (.10)	3,060	-549* (.00)	3,287

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 88 participating agencies provided a total of 314 agency years of data.

NOTE: *P*-values are in parentheses.

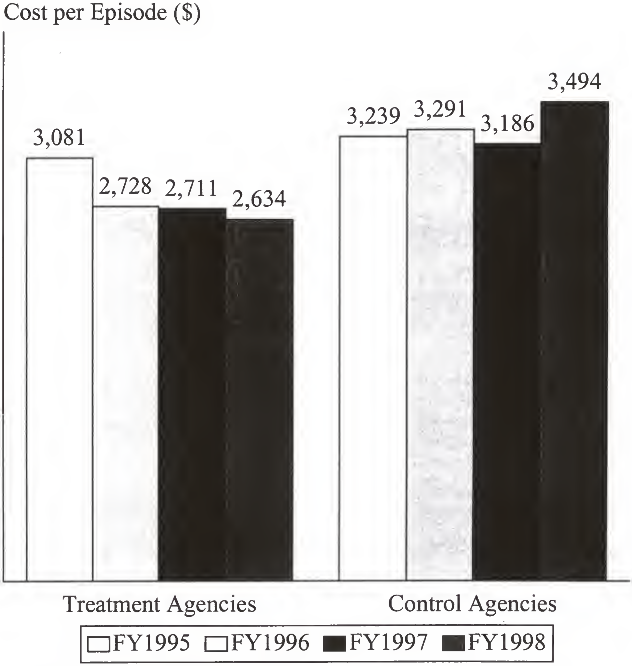
[a] These impact estimates are difference-in-difference estimates comparing the treatment and control groups between the baseline year and demonstration years.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.
†Significantly different from year 1 impact at the .10 level, two-tailed test.
‡Significantly different from year 1 impact at the .05 level, two-tailed test.

FIGURE III.1

AVERAGE COST PER EPISODE



SOURCE: Medicare cost reports and bill records.

NOTE: The number of observations varies by year.

episode even without changing their care patterns. Thus, the savings we observe may not be savings of real resources; rather, they may reflect the favorable selection of patients with fewer care needs.

Previous research found no evidence that agencies favorably selected patients they were seeing for the first time (when they would have little information about the patient); however, patients who were readmitted to prospectively paid agencies had slightly lower predicted service costs, on average, than did those who were readmitted to cost-reimbursed agencies (Trenholm 2000b). Although this slight degree of favorable selection of readmitted patients appears to be due to factors other than an agency's practices, it suggests that agencies may be saving more on subsequent episodes than on the first one. Policymakers will be concerned about this issue, especially if all the cost savings are driven by these repeat admissions, as it suggests that agencies may not be conserving real resources.

To determine whether agencies were lowering costs regardless of possible favorable selection, we reestimated our impact estimates on the cost per episode, using only the first episode we observed for each patient at a particular agency (see Table III.1).[4] We found that our overall impact estimates on the cost per episode were still quite strong, although the cost savings fell from $457 per episode to $411, reducing the savings from 14 percent to 13 percent of the predicted cost per episode. Thus, although agencies may have saved more on their readmitted patients, they also were conserving substantial resources on their initial admissions.

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[4] This episode is the first one observed under the demonstration. Thus, in the early years of the demonstration, some of the "first" episodes may actually have been repeat observations from the year or years preceding the demonstration. Because agencies did not have the incentive to favorably select patients until the demonstration began, this measure enables us to examine whether agencies were able to lower costs for first-time entrants. However, we cannot draw any conclusions about the differences in impacts over time, as the patients whom we identified as "first" admissions in year 3 may have differed in underlying ways from those identified in year 1.

B. DEMONSTRATION IMPACTS ON COST PER VISIT

The 14 percent decline in the cost per episode could have been driven by two methods. First, agencies could have reduced their cost per visit for services rendered during their episode of care. Second, they could have altered the volume or mix of services provided per patient episode by taking such actions as reducing the number of total visits provided and/or changing the visit mix to favor less expensive types of care. Previous research has demonstrated that agencies did reduce the amount of services rendered, although they did not alter the composition of services (Trenholm 2000a; and Archibald and Cheh 2000). Since Trenholm's work used patient-level data, we reestimated the results using fixed effects models, and confirmed his results. (See Appendix B, Tables B.1 and B.2). This leads us to question and analyze what happened to per-visit costs.

Prospective payment significantly increased the cost of skilled nursing and home health aide visits. The average cost of a skilled nursing visit increased by $13, or about 14 percent higher than the $94 per-visit cost that would have occurred without prospective payment (see Table III.2). Similarly, the average cost of a home health aide visit increased by $4, a 10 percent increase over the $41 cost per home health aide visit in the absence of the demonstration. Costs for the remaining four types of visits also increased, with impacts for physical therapy (11 percent increase) and medical social worker visits (19 percent increase) being statistically significant at the .10 level or higher. The impacts on occupational therapy visits and speech therapy visits were insignificant, possibly in part because of low use, and because some agencies do not offer these services. Skilled nursing and home health aide visits constituted 87 percent of the average agency's home health visits in our sample, so the remaining discussion will focus primarily on these two outcomes.

TABLE III.2

IMPACTS OF PROSPECTIVE PAYMENT ON COST PER VISIT

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Skilled Nursing	12.78*	93.91	10.75*	89.59	12.07*	93.25	15.52*	99.21
(n = 470)	(.00)		(.01)		(.00)		(.00)	
Home Health Aide	4.02*	41.24	2.63	38.99	3.79*	41.46	5.64*	43.39
(n = 468)	(.00)		(.17)		(.05)		(.00)	
Physical Therapy	11.44	105.30	14.01	98.34	11.97	106.68	8.33	111.17
(n = 450)	(.10)		(.14)		(.21)		(.40)	
Occupational Therapy	3.21	118.59	3.40	116.69	-5.83	129.14	12.08	109.84
(n = 399)	(.71)		(.77)		(.62)		(.32)	
Speech Therapy	9.02	118.60	18.84	104.66	11.20	122.06	-2.97	129.83
(n = 405)	(.40)		(.21)		(.46)		(.85)	
Medical Social Worker	28.24*	146.90	3.62	141.97	41.98*‡	146.00	39.13*‡	153.10
(n = 444)	(.01)		(.80)		(.00)		(.01)	

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 88 participating agencies provided a total of 470 agency years of data during this six-year period. Because of missing data from some agencies, the sample used for the different dependent variable may vary.

NOTE: *P*-values are in parentheses.

[a] These impact estimates are difference-in-difference estimates comparing the treatment and control groups between the baseline year and demonstration years.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.
†Significantly different from year 1 impact at the .10 level, two-tailed test.
‡Significantly different from year 1 impact at the .05 level, two-tailed test.

Although as a proportion the impact per episode payment on skilled nursing and home health aides was approximately the same, the magnitude of the former was substantially higher ($12.78 versus $4.02). This likely reflects two factors. First, many of the changes made to reduce visits per episode were implemented by nursing staff (for example, making telephone calls instead of visits). Thus, the costs of these new procedures would more likely be reflected in skilled nursing visit costs. Second, agencies were more likely to pay their nurses on salary basis, but pay their aides an hourly wage. At the start of the demonstration, 55 percent of the agencies predominantly paid nurses a salary, compared with 31 percent that paid home health aides a salary. Since volume declined during the demonstration, nursing staff may have had fewer visits to make but salary costs would remain constant, putting upward pressure with the cost per visit. Since more aides were paid on an hourly basis, as volume declined, their wages decline, putting less upward pressure on the cost per visit. Finally, since volume declined more at treatment agencies relative to the controls (Cheh et al. 2000), it follows that the impact would be larger on skilled nursing cost per visit.

In addition to examining the average impacts of prospective payment on cost per visit, it is important to determine whether these impacts persisted throughout the demonstration. If the impacts on cost per visit over the three years were driven by a very large impact in year 1 that dissipated in later years, then the impact on cost per visit could be viewed as a transitory cost of moving from cost-reimbursement to prospective payment. However, a finding that impacts remained strong throughout the demonstration implies that the increase in cost per visit is more likely to be a permanent change associated with operating a prospective payment system.

We find that the estimated impacts of prospective payment on cost per visit for skilled nursing and home health aide were likely to be nominally larger and present during the later years of the demonstration. The impacts on skilled nursing visits were present during every year of the demonstration; however, the increased costs for home health aide and medical social worker visits were significant during the second and third years but not during the first one. Nevertheless, the impacts across years for any particular discipline were not significantly different from one another (with the exception of the impacts on medical social worker visits). This finding suggests that the observed impacts cannot be explained only by temporary transition costs.

1. What Caused the Increase in Per-Visit Costs?

Per-visit costs may have increased because agencies that reduced their visits per episode also may have also reduced their overall volume of visits. However, if agencies were not able to reduce all their overhead and fixed expenses as quickly as they reduced visits, they may have incurred higher per-visit costs. That is, economies of scale would drive up costs. To investigate this issue, we estimated the regressions while controlling for the agencies overall volume of service (see Table III.3).

Controlling for the agency volume of services reduces the demonstration impacts on cost per visit for every type of visit while maintaining similar levels of significance. For example, when we controlled for the volume of service provision, the demonstration impact on the cost per skilled nursing visit decreased by 12 percent, from \$12.78 to \$10.11. This change suggests that a portion of the demonstration impact on cost per visit is a result of changes in the agency-level volume of service provision. However, it also shows that prospective payment significantly increased cost per visit, independent of its effect on the agency volume of care.[5]

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[5] It is also possible that a change in agency case mix had an effect on per visit costs. Because we only had four years of patient level data, we were unable to control for both volume and patient characteristics in the baseline model, which contained six years of data. However, Table B.3 in Appendix B indicates that controlling for patient characteristics in addition to the volume of services does not substantially change the results.

TABLE III.3

IMPACTS OF PROSPECTIVE PAYMENT ON COST PER VISIT, CONTROLLING FOR AGENCY VOLUME

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Skilled Nursing (n = 470)	10.11* (.00)	95.23	8.50* (.04)	90.72	9.41* (.02)	94.58	12.43* (.00)	100.73
Home Health Aide (n = 468)	3.56* (.01)	41.46	2.50 (.18)	39.06	3.36 (.08)	41.68	4.83* (.01)	43.79
Physical Therapy (n = 450)	9.37 (.18)	106.34	12.15 (.21)	99.28	9.90 (.30)	107.73	6.06 (.54)	112.33
Occupational Therapy (n = 399)	0.39 (.96)	119.98	1.10 (.93)	117.82	-8.36 (.49)	130.40	8.43 (.49)	111.63
Speech Therapy (n = 405)	5.29 (.63)	120.44	15.07 (.32)	106.49	7.07 (.65)	124.12	-6.28 (.69)	131.44
Medical Social Worker (n = 444)	26.07* (.01)	147.96	1.66 (.91)	142.93	39.86*‡ (.01)	147.03	36.68*‡ (.01)	154.31

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 88 participating agencies provided a total of 470 agency years of data during this six-year period. Because of missing data from some agencies, the sample used for the different dependent variable may vary.

NOTE: *P*-values are in parentheses. Regressions control for changes in the total number of a given type of visit.

[a] These impact estimates are difference-in-difference estimates comparing the treatment and control groups between the baseline year and demonstration years.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.
†Significantly different from year 1 impact at the .10 level, two-tailed test.
‡Significantly different from year 1 impact at the .05 level, two-tailed test.

One likely explanation for the increase in per-visit costs is that it is a by-product of efforts by treatment agencies to provide more efficient delivery of *per-episode* services. Prospectively paid agencies indicated that they reduced the number of their visits per episode in a variety of ways, some of which also were likely to increase per-visit costs. Most notably, during our site visits, the agencies indicated that a key way they reduced visits per episode was by increasing staff supervision—reviewing their care plans and their continuing cases to look for ways to reduce visits. To test this, we included the number of visits per episode from each year in the regression and found that the cost per visit increased more among agencies that were the most aggressive in reducing visits.[6] The regression coefficient estimates on the number of visit per episode in Table III.4 indicate that reductions in the number of each type of visits per episode increased the average cost per visit. These increases were significant at the five percent level in all cases with the exception of occupational therapy visits. This finding is consistent with one by Cheh and Trenholm (1999). These researchers reported substantial reductions in cost per visit impacts when controlling for the volume of per-episode service provision.

Although a reduction in the number of visits per episode explains part of the demonstration impact on cost per visit, a large portion remains unexplained. Evidence obtained during site visits suggests that a number of factors, some transitory and others long-term, contributed to the increase in cost per visit. Both treatment agencies and control agencies indicated that they incurred additional transitory costs as a result of the demonstration, and both generally cited the training cost for the quality assurance (QA) instruments as the biggest component of that cost. Another cost, that of developing software to "split-bill" at 120 days, applied to the treatment agencies but not to the

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[6] Appendix Table B.4 in Appendix B shows the impact estimates from this regression.

TABLE III.4

THE EFFECTS OF VISITS PER EPISODE ON COST PER VISIT

Dependent Variable	Coefficients on Number of Visits per Episode	Predicted Mean Without Intervention[b]
Skilled Nursing (n=315)	-1.19* (.00)	96.84
Home Health Aide (n=315)	-0.28* (.01)	40.75
Physical Therapy (n=304)	-5.44* (.00)	109.73
Occupational Therapy (n=273)	-11.08 (.14)	122.40
Speech Therapy (n=274)	-31.07* (.04)	121.37
Medical Social Worker (n=297)	-32.40* (.01)	151.21

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 88 participating agencies provided a total of 470 agency years of data during this six-year period. Because of missing data from some agencies, the sample used for the different dependent variable may vary.

NOTE: *P*-values are in parentheses. Regressions control for changes in the total number of a given type of visit.

[a] These estimates are difference-in-difference models. The impact estimates are shown in Table B.4.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.

control agencies.[7] However, we should caution that most agencies did not track these costs, so the evidence is merely suggestive. Treatment agencies undertook a number of initiatives that were likely to result in long-term cost-per-visit increases. The most commonly implemented ones were closer supervision of service utilization (68 percent of agencies) and development and training of staff to use care maps (56 percent).[8] Initiatives employed by approximately 40 percent of agencies include the increased use of specialists and better patient education. However, many agencies indicated that some of these efforts were ineffective in decreasing utilization, and thus are not explained by reductions in episode use.

2. Impact on Length of Visit

Agencies could have responded to the demonstration incentive by increasing the length of a visit, an action that might account for the increased cost per visit. In an effort to reduce the number of visits, agencies had the incentive to encourage staff to accomplish more in each visit, thus increasing the length of time per visit. At the same time, however, agencies had the incentive to control costs and reduce the length of the visit.

We find little evidence that agencies changed the length of the visits in response to prospective payment, although it is possible that some agencies did increase the length of a skilled nursing visit. The average length of a skilled nursing visit was about three-quarters of an hour for both groups of agencies (Table III.5). However, when we examine agencies whose average visit length was materially different (that is, was either longer than one hour or shorter than one-half hour), we find

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[7] During the demonstration, treatment agencies must split their bill at the end of 120 days to differentiate the visits covered by the episode payment and those covered by the outlier payment method.

[8] Case maps add to long-term costs because they need to be updated and all new staff have to be trained in their use.

TABLE III.5

IMPACTS ON LENGTH OF VISIT

	Control Group Mean	Impact (*P*-value)
Skilled Nursing Visit (n = 47)		
Average length of visit (hours)	.73	.01 (.07)
Probability of an average visit exceeding 1 hour (percentage)	0	.10 (.04)
Probability of an average visit of less than 0.5 hour (percentage)	.02	-.02 (.61)
Home Health Aide Visit (n = 46)		
Average length of visit (hours)	1.0	.01 (.74)
Probability of an average visit exceeding 1.5 hours (percentage)	0	.07 (.14)
Probability of an average visit of less than 0.75 hour (percentage)	.05	.02 (.69)

SOURCE: Agency time sheet survey.

that significantly more prospectively paid agencies had skilled nursing visits averaging longer than one hour, but that there was no difference in the number that fell below one-half hour. None of the control group agencies' visits averaged longer than one hour.

Why do we believe this difference may be related to prospective payment, rather than dismiss it as a statistical artifact? During our site visits to the agencies, we asked staff whether the length of a visit was increasing or decreasing, and why. Whereas 47 percent of the prospectively paid agencies were of the opinion that their visit lengths were increasing, only 39 percent of the cost-reimbursed agencies felt this was the case. Even more suggestive were the reasons given to explain the increase in visit length. Treatment agency staff were likely to cite increased time spent teaching (which, they argued, requires more time than does direct care alone) and accomplishing more in each visit. In contrast, cost-reimbursed agency staff were likely to cite increased patient acuity—a factor that typically is related to changes in the marketplace, and that generally affects all agencies in a market. (For example, control-agency staff cited the decreasing length of hospital stays as a factor explaining rising acuity levels.) Thus, we hesitate to conclude that the length of the skilled nursing visit increased as a result of prospective payment, but neither do we want to conclude that prospective payment had no impact.

Prospective payment did not affect the length of a home health aide visit. Both treatment and control agencies' home health aide visits lasted an average of about one hour. We also failed to find any significant differences when we examined visit lengths that were substantially longer or shorter than the one-hour visit; both prospectively paid and cost-reimbursed agencies were equally likely to provide very long or very short visits. Furthermore, virtually none of the agencies we visited indicated that the length of the home health aide visit was increasing.

So, what caused the cost per visit to rise? We find solid evidence that per-visit costs rose as a result of prospective payment; in addition, agencies that were the most aggressive in reducing visits per episode had the largest cost increases. Part of the cost increase can be attributed to changes in agency volume; the impact estimate on skilled nursing fell 20 percent when volume was included, and the impact on home health aide costs fell 11 percent. Agencies simply were unable to reduce their overhead costs fast enough to keep up with the reduction in visits under prospective payment. We expected that increases in the length of a visit might explain another large part of the impact. However, we find no evidence that prospective payment led to significant increases in the length of a home health aide visit, and only weak evidence that it led to increases in the length of a skilled nursing visit. Thus, the other strategies that the agencies cited (but that we cannot measure directly), such as increased supervision of staff and increased use of specialized nursing staff, most likely account for the increased costs under prospective payment.

C. DID THE DEMONSTRATION AGENCIES EARN A PROFIT?

The ability to earn profits is the major incentive for the agencies participating in the demonstration. Under the present cost-reimbursement system, agencies are not allowed to earn profits. They are paid their costs, unless (1) their costs exceed the cost limits, in which case they are paid the cost limit; or (2) their charges fall below their costs, in which case they are paid their charges. Thus, under cost-reimbursement, agencies can do no better than to break even on their Medicare business. This demonstration provided a unique opportunity for agencies to earn profits on their Medicare patients, and to use those profits for any reason they so chose.

HCFA is concerned about the ability of agencies to earn profits or at least break even. Even if prospective payment results in widespread savings, this payment system will not be "useful" to

HCFA unless a substantial proportion of the agencies can survive financially. HCFA must have financially viable institutions available to serve its beneficiaries. If a substantial proportion of the agencies fails to survive under prospective payment, then access to care could be harmed by the payment system.

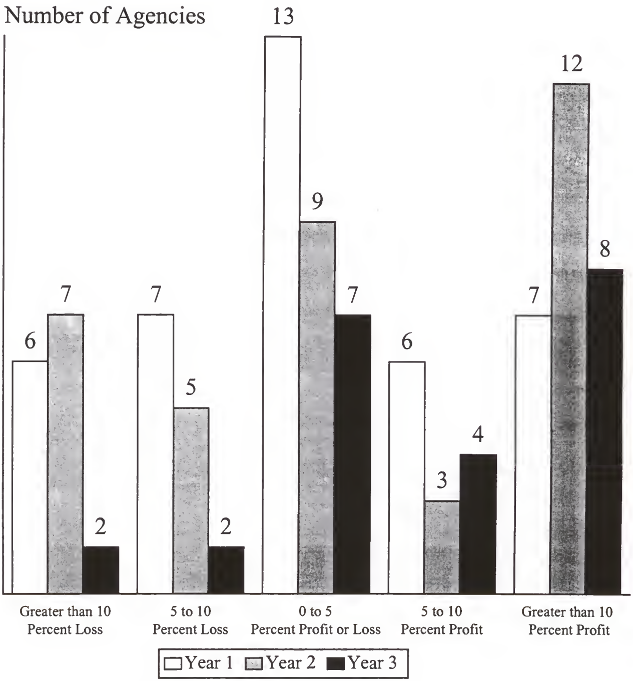
Although it is by no means certain, we expect that agencies will earn a profit on their Medicare business. Agencies can earn a profit primarily by reducing their costs per episode, which would enable them to keep the difference between their predetermined episode payment and their episode costs. As we have seen, prospectively paid agencies were able to lower their per-episode costs. However, we also saw that prospective payment increased the cost per visit. The prospective payment system paid agencies a predetermined per-visit rate (adjusted for inflation) for outlier visits (visits rendered after the 120th day). If the cost of a prospectively paid agency's visit rose more than the inflation rate, then the agency would lose money on outlier visits. Depending on the number of its outlier visits, an agency could incur losses on these visits that would outweigh any profits earned on its episodes.

1. Did Agencies Earn a Profit on Their Medicare Business?

Overall, agencies earned very small profits on Medicare services during the demonstration. During the first demonstration year, agencies roughly broke even; 13 agencies earned profits in excess of five percent of their total Medicare revenues, and 13 lost five percent or more, for an overall median profit rate of nearly zero (see Figure III.2). By year 2 of the demonstration, a slightly higher proportion of the prospectively paid agencies earned positive profits; however, fewer agencies had settlement reports, so it is difficult to conclude that more agencies did better under prospective

FIGURE III.2

PROSPECTIVELY PAID AGENCY MEDICARE PROFIT AS A PERCENTAGE OF TOTAL MEDICARE VISIT REVENUE



SOURCE: Medicare cost reports.

NOTE: Profit rates are calculated without accounting for the demonstration-specific profit- and loss-sharing arrangement.

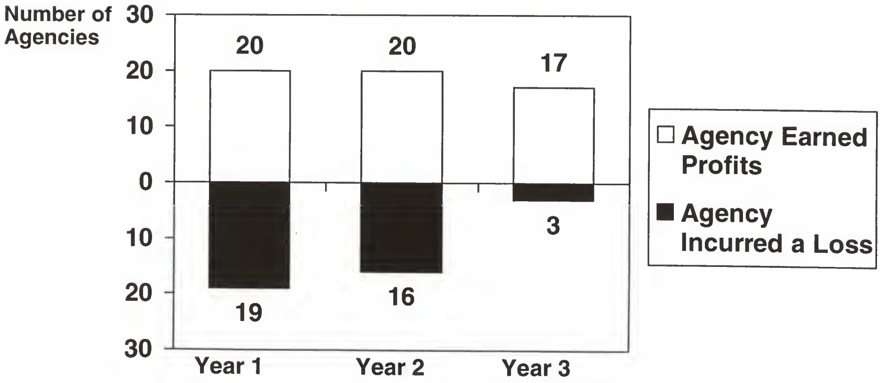
payment (Figure III.3). By year 3, an even higher proportion of agencies earned a profit, but again, it is difficult to draw any conclusions, as even fewer agencies had complete data.

It is clear that agencies were earning larger profits over time. The median profit rate of agencies for which we have three years of data rose from 2.6 percent in year 2 to 7.8 percent in year 3. For those with two years of data, the rate increased from −0.6 percent in year 1 to 2.8 percent in year 2. The mean profit rate increased even more, as a few agencies earned very high profits in year 3 of roughly 20 percent.

Why did the profits increase over time? This change was partly due to the decrease in the proportion of services covered by the per-visit payment mechanism. Prospectively paid agencies were earning profits on their per-episode clients because they had decreased service use during the first 120 days. However, on average, they were losing money on their per-visit service patients, because the per-visit costs rose more than the inflation adjuster. (Although the treatment agencies' cost of an average skilled nursing visit rose 12.0 percent in year 1, the base-year inflation adjuster averaged only 3.3 percent.) These services that were paid on a per-visit basis were provided to a combination of two types of patients: (1) phase-in patients, whose episodes of care started before the demonstration; and (2) outlier patients, whose episodes of care exceeded 120 days. During the demonstration, the number of patients who were paid under phase-in decreased, as did the number of visits rendered after 120 days. Thus, the average proportion of visits reimbursed under the per-visit methodology decreased from 67 percent in year 1, to 57 percent in year 2, and to 53 percent in year 3. In other words, the proportion of profit-losing visits was declining, allowing profit rates to increase.

FIGURE III.3

IT IS UNCLEAR WHETHER MORE PROSPECTIVELY-PAID AGENCIES EARNED PROFITS OVER TIME



Source: Medicare Supplemental Cost Report

Comparing profits as a percentage of visit revenues enables us to understand how agencies are doing relative to their size. It also is important to assess the magnitude of the profits, and how they add up over time. As Table III.6 shows, through the first two years of the demonstration, 10 agencies (28 percent) earned more than a half-million dollars of profits (before profit sharing).[9] More than half earned more than $100,000 on their Medicare business. Conversely, however, 3 agencies (8 percent) lost a half-million dollars or more, and 13 agencies (36 percent) lost more than $100,000.

One concern for HCFA is whether the agencies that lost money during the two years shared key characteristics suggesting access to care could be hampered. For example, if all the agencies that lost money under the prospective payment system were visiting nurse associations (VNAs), then access to care might be hampered in areas of the country in which VNAs are the predominant provider. An examination of whether different types of agencies earned or lost money showed that small agencies (those with fewer than 30,000 visits per year in the base year) were more likely to lose more than $100,000 during the first two years; however, nearly 40 percent of the small agencies earned more than $100,000 (see Table III.7). Furthermore, because Texas has a higher proportion of small agencies relative to the other states in the sample, the majority of the agencies in this state lost money.

How did the agencies explain these losses? Their managements attributed the losses to their agencies' inability to respond quickly enough to the new environment and payment system. Two-thirds of the agencies that received site visits and that lost money gave the following explanation for

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[9] Agencies did not earn or lose the actual amount of money reported here, because the demonstration contains a profit- and loss-sharing arrangement. We reported the profits and losses that agencies incurred before profit and loss sharing because a national payment system would not have such an arrangement.

TABLE III.6

CUMULATIVE MEDICARE PROFITS FOR PROSPECTIVELY PAID AGENCIES DURING THE FIRST TWO YEARS OF THE DEMONSTRATION

Loss	
$500,000 or more	3
$499,999 to $100,000	10
$99,999 to $1	2
Gain	
0 to $100,000	2
$100,001 to $500,000	9
More than $500,000	10

SOURCE: Medicare cost reports. Four agencies were excluded because they did not submit settlement reports in years 1 and 2 of the demonstration.

NOTE: Profit rates are calculated without accounting for the demonstration-specific profit- and loss-sharing arrangements.

TABLE III.7

DISTRIBUTION OF PROFITABLE AND NONPROFITABLE AGENCIES BASED ON TWO-YEAR CUMULATIONS

(Percentage of Agencies)

	Lost More than $100,000	Earned or Lost Less than $100,000	Earned More than $100,000
For-profit (N = 19)	47	11	42
Nonprofit (N = 17)	24	12	65
Small Agencies (N = 13)	54	8	38
Large Agencies (N = 23)	26	13	61
California (N = 8)	13	13	75
Florida (N = 3)	0	0	100
Illinois (N = 6)	50	17	33
Massachusetts (N = 5)	20	20	60
Texas (N = 14)	57	7	36

NOTE: Rows may not add to 100 percent due to rounding error.

their loss: Their visits fell so rapidly during the period that they couldn't cut their overhead costs fast enough. The agencies that lost more than $100,000 had a decrease in total visits of an average of 42 percent between their base year and year 2; in contrast, total visits of those that earned profits fell 28 percent. As we have noted, this decrease contributed to the increase in cost per visit, which, in turn, resulted in greater losses for visits that were paid as outlier visits.

Agencies also cited bad business decisions as a major cause of the problem. For example, one agency had developed software to track payments but failed to realize that the software counted every patient as a "new" patient at the beginning of a calendar year, rather than allowing episodes to carry over. At the same time, the agency fell into arrears in its billing and relied on its own inaccurate estimates of profitability to guide its business decisions. As a result, the agency believed it had more than sufficient funds and continued to maintain the status quo, even though it should have reduced staffing. Another agency's management did not appear to understand the concept of the payment system. It reported having instructed nurses to visit patients who had been discharged from care, because it was "costless" to do so. Of course, profitable agencies probably made bad business decisions as well. However, because these agencies earned profits, their managements overlooked such mistakes. But what is informative is that the agencies did not cite the payment system as the reason for their failure. The fact that they cited internal operating factors even after two years of experience and losses suggests demonstration agencies still believed they could prosper under the new payment system.

2. Did Agencies Earn a Profit Overall?

Another important financial issue is whether the payment system had an impact on overall profitability, or net revenues.[10] Prospective payment can affect an agency's ability to earn profits in other business areas. For example, if management concentrated on implementing prospective payment and failed to focus on other areas, the agency might have missed opportunities to earn profits in these other areas. Alternatively, the agency could have used prospective payment to improve its other lines of business (for example, by referring its Medicare patients to its private duty operations sooner than it normally would have done).

Before the demonstration, the median agency generally earned a small but steady profit. For the three years prior to the demonstration, a treatment agency earned a median yearly profit that varied between $42,500 and $48,200; control agency profits varied between $27,700 and $37,800 (see Table III.8). However, total profits varied enormously across agencies during that period, with a few agencies reporting earning millions of dollars on all their business lines, and others reporting losing hundreds of thousands of dollars. This wide range of profits and losses reflects the vast differences in the product lines offered. Some agencies concentrated on Medicare home health as their major business line; others offered such services as personal care, private duty nursing, and mail order pharmacy, as well as serving as landlords.

After the first year of the demonstration, the trend seemed to shift. The median treatment and control agencies experienced substantial declines in their profits, with the typical treatment agency losing money in years 2 and 3, and the typical control agency losing money in year 2 and earning only $6,000 in year 3. However, as in the years before the demonstration, there was significant

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[10] Technically, nonprofit agencies do not earn profits. However, they do have net revenues, which is the difference between their total revenue (from all sources) and total costs over an operating period.

TABLE III.8

MEDIAN NET REVENUES (TOTAL PROFITS) FOR FREESTANDING AGENCIES, BY TREATMENT STATUS
(In Thousands of Dollars)

Year	Prospectively Paid Agencies	Control Agencies
Predemonstration Years		
FY1993	42.6	37.8
FY1994	48.2	34.4
FY1995	42.5	27.7
Demonstration Years		
FY1996	40.4	38.8
FY1997	-7.6	-38.6
FY1998	-22.9	6.0

SOURCE: Medicare cost reports for 71 freestanding agencies.

NOTE: The actual number of observations varies across years because of missing data. See Chapter II for a detailed explanation.

variation in the amount of profits earned, so that it is impossible to differentiate real trends from yearly anomalies.

Our impact estimates suggest that prospective payment did not affect the freestanding agencies' total profits (see Table III.9). For every year, our estimated impact of prospective payment on total profits was insignificant, with the difference being negative in some years, but positive in others. Thus, even though the agencies were earning small profits from their Medicare patients, this profitability did not lead to detectable improvements in the agencies' bottom lines.

D. IMPACT ON MEDICARE VISIT REVENUES AND TOTAL REVENUES

Another agency financial issue that concerns HCFA is what happened to the agencies' Medicare revenues. HCFA uses Medicare revenues to pay for services. Under the cost-reimbursement system, an agency's costs and Medicare payment were almost the same, differing only if agencies lost money because their per-visit costs were too high. Under prospective payment, however, costs and reimbursement no longer are tied, and costs cannot serve as a near mirror image of revenues. Thus, we must understand what happens to revenues, as prospective payment may not be a good policy choice if it results in higher levels of expenditures for the Medicare program.

Prospective payment actually reduced total Medicare home health visit revenues. The average annual impact was $874,000, representing a 20 percent reduction from what the revenues would have been had the agency not operated under prospective payment (see Table III.10). Although this impact did not arise during the first year of the demonstration, it became large and strongly significant during the second and third years.[11]

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[11] Because of the number of agencies that dropped out of the demonstration in year 3, the magnitude of these estimates is not directly comparable. However, even with a constant sample of agencies across time, the pattern was the same.

TABLE III.9

IMPACTS OF PROSPECTIVE PAYMENT ON NET REVENUES (TOTAL PROFITS)
(In Thousands of Dollars)

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Net Agency Revenues (Total Profits) (n = 372)	37.45 (.84)	64.66	−287.00 (.26)	380.40	206.40 (.42)	−106.80	192.94 (.48)	−112.01

SOURCE: These estimates are based on data from Medicare cost reports from the three years of the demonstration. Because some agencies did not provide reports for all three years, the sample sizes vary across years. In addition, net agency revenue data are available only for 71 freestanding agencies.

NOTE: Dollars are expressed in thousands, and *P*-values are in parentheses.

[a] These impact estimates are difference-in-difference estimates comparing the treatment and control groups between the baseline year and demonstration years.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.
†Significantly different from year 1 impact at the .01 level, two-tailed test.
‡Significantly different from year 1 impact at the .05 level, two-tailed test.

TABLE III.10

IMPACTS OF PROSPECTIVE PAYMENT ON AGENCY REVENUES
(In Thousands of Dollars)

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Total Medicare Home Health Visit Revenues (n = 447)	-874* (.00)	4,360	-468 (.18)	5,012	-1,091* (.00)	4,291	-1,062*† (.01)	3,600
Total Revenues (n = 371)	-1,855 (.06)	8,401	-2,407 (.07)	9,446	-2,825* (.04)	9,062	-334 (.82)	6,456

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and the three prior years. The 88 participating agencies provided a total of 447 agency years of data during this six-year period. Because of missing data form some agencies, the sample of agencies used for the different dependent variables may vary. In addition, agency revenue data are available only for 66 freestanding agencies; Medicare visit revenues are available for all agencies.

NOTES: Dollars are expressed in thousands, and *P*-values are in parentheses.

[a] These impact estimates are difference-in-difference estimates comparing the treatment and control groups between the baseline year and demonstration years.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.
†Significantly different from year 1 impact at the .01 level, two-tailed test.
‡Significantly different from year 1 impact at the .05 level, two-tailed test.

Why were revenues so much lower for the prospectively paid agencies? The key reason is that agencies reduced the number of visits during the outlier period. In addition to reducing the proportion of episodes that continued into the outlier period, agencies also reduced the number of visits they rendered to patients whose episodes continued into that period (Trenholm 2000a). Thus, even though agencies were collecting the same amount of revenue as they would have for the at-risk period (because the decline in the number of visits did not affect agency revenues), they collected fewer revenues on the outlier visits, for which they were paid a per-visit rate.

The other contributing factor is the greater increase in per-visit reimbursement for control agencies than for treatment agencies. Under demonstration rules, prospective payment rates were set during the base year of the demonstration and were increased only in response to inflation.[12] Inflation rates averaged 2.2 percent in year 2 and 3.0 percent in year 3 for treatment agencies.[13] However, the control agencies were still paid their costs. These costs rose faster than the inflation rate, as the average cost per visit rose an average of 5.5 percent in year 2, and 5.2 percent in year 3.[14] Thus, the control agencies per visit revenue rose faster than the treatment agency's per visit revenue for outlier visits.

Finally, case-mix differences between treatment and control agencies could also affect demonstration impacts on Medicare visit revenue. However, the case-mix data suggest that this is not a factor. In general, the case-mix index, which equals 1 in the base year, changed very little.[15] For the treatment agencies, it rose to 1.006 in year 1, and fell to .993 in year 2, and .996 in year 3.[16] The control agencies had a similar pattern—rising to 1.008 in year 1, and falling slightly more to .991 in year 2, and to .992 in year 3. Since the index was slightly higher for the treatment agencies in years 2 and 3 (when we observe the negative impact on Medicare revenues), case-mix differences do not contribute to the revenue impact.

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[12] HCFA's market basket was the inflation factor used in the demonstration. We computed the average of the treatment agencies factors. Data was provided by Abt Associates.

[13] The inflation factor for year 3 represents only the 23 treatment agencies that provided settlement reports.

[14] The average cost per visit is computed as the average of all six types of home health visits weighted by the percentage of total visits attributable to a given type. Cost limits were imposed on control agencies if their total Medicare program cost exceeded the cost limit. We accounted for this in the cost-per-visit calculation by deflating the average cost per visit for agencies exceeding the cost limit by the percentage by which the agency's total program cost exceeded the cost limit. Inflation is calculated based on the previous year.

E. ROBUSTNESS TESTS

To ensure that our estimates of the demonstration impacts are not heavily dependent on particular observations or unusual circumstances, we performed several robustness tests, which we discuss in this section. First, we estimated whether the existence of outliers, either within or across agencies, might have had undue influence on our findings. Second, we examined whether agencies that we knew were going out of business after the demonstration ended had a strong impact on our findings. Third, we examined whether the exclusion of agencies that had poor billing practices affected the estimated impacts.

1. Outliers

With the use of data from as few as 66 agencies when estimating impacts, it is possible that the presence of outliers could affect the estimates. To address this issue, we excluded the agencies with the two highest and the two lowest agency-year values in both the treatment and control groups for a given outcome in a given year. Thus, as many as eight agencies were removed from the analysis.[17] The removal of these outlier agencies left approximately 90 percent of the sample intact.

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[15] See Appendix A for the case-mix index calculation.

[16] Agency case-mix data is from Abt Associates, covering claims processed through June 1999.

The results in Table III.11 show that our average annual impacts continue to be statistically significant after outliers are excluded; that is, prospective payment still decreases episode costs, increases visit costs, and reduces revenues. However, the magnitude of the estimated impacts is sensitive to the inclusion of outliers. For two of our outcome measures—total revenues and home health aide cost per visit—the magnitude of the estimated impact fell more than 40 percent. However, the magnitude of the impact on Medicare visit revenues increased, from 22 percent to 30 percent.

We have no reason to believe that our outlier values reflect inaccurate data. Therefore, in our main analysis, we have chosen to include outliers when presenting the impacts. However, we caution that the reader must bear in mind the sensitivity of these results to the inclusion of outliers when drawing any conclusions.

2. Exclusion of Agencies that Were About to Close or Merge

Agencies that already had planned to end operations soon after the end of the demonstration might have behaved very differently from ongoing concerns. For example, as they neared the end of their existence, they might have prepared for the transition to a closure or merger by ceasing to admit patients. Thus, their data, while technically accurate, might have not reflected typical costs associated with patient care.

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[17] An agency that submitted cost reports in all six years would contribute six years of data to the analysis. Thus, an agency could account for more than one outlier value in different years. In this case, fewer than eight agencies would be dropped.

TABLE III.11

SENSITIVITY ANALYSIS FOR THE IMPACT OF PROSPECTIVE PAYMENT ON AGENCY OUTCOMES

	Baseline Estimate		Without Outliers		Without Agencies Who Were Ceasing to Exist		With Agencies with Serious Billing Problems	
	Average Annual Impacts[a]	Predicted Mean Without Intervention[b]	Average Annual Impacts[a]	Predicted Mean Without Intervention[b]	Average Annual Impacts[a]	Predicted Mean Without Intervention[b]	Average Annual Impacts[a]	Predicted Mean Without Intervention[b]
Total Revenues (in Thousands)	-1,855 (.06)	8,401	-1,113* .00	6,428	-1,913 (.07)	9,036	-1,843* (.04)	8,138
Medicare Visit Revenues (in Thousands)	-874* (.00)	4,360	-1,125* (.00)	4,106	-856* (.00)	4,579	-1,008* (.00)	4,329
Total Profits (in Thousands)	37.45 (.84)	64.7	-22.1 (.74)	14.9	75.33 (.71)	60.1	14.5 (.93)	31.0
Cost per Episode	-457* (.00)	3,233	-393* (.00)	3,177	-542* (.00)	3,277	-535* (.00)	3,206
Cost per Skilled Nursing Visit	12.78* (.00)	93.91	9.83* (.00)	93.37	9.79* (.00)	94.62	16.61* (.00)	94.56
Cost per Home Health Aide Visit	4.02* (.00)	41.24	1.91 (.09)	41.55	3.57* (.01)	41.47	7.71* (.00)	41.44

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and three prior years (one prior year for cost-per-episode impacts). Because of missing data from some agencies, the sample of agencies used varies across dependent variables. Outliers were excluded by deleting agencies containing the two highest and the two lowest values in the sample for a given dependent variable (resulting in the exclusion of as many as eight agencies). Excluding agencies that were ceasing to exist involved deleting the six agencies that merged or were planning to do so. Seven agencies that had previously been excluded due to serious billing problems were added in the final column.

NOTE: Dollars are expressed in thousands for Total Revenues, Medicare Visit Revenues, and Total Profits. *P*-values are in parentheses.

[a] These impact estimates indicate the average annual change during the three years of the demonstration.

[b] The predicted means without intervention are regression adjusted and represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration.

*Significantly different from zero at the .05 level, two-tailed test.

To examine this issue, we identified the agencies that had informed us during site visits that they were intending to merge or close at the end of the demonstration or soon thereafter. We excluded six agencies from our analysis and reestimated our models.

Our results show that the exclusion of the six agencies had little effect on most of the estimated impacts. All the impact estimates remained statistically significant, and the impacts on total revenues, Medicare visit revenues, and cost per home health aide visit changed by 11 percent or less. The cost per episode and the cost of a skilled nursing visit changed by somewhat larger percentages (19 percent and 23 percent, respectively). These changes were consistent with our expectation that agencies intending to close or merge would stop admitting patients, especially patients who would require long periods of care. A halt in patient inflow reduces the number of visits and increases per-visit costs (as the overhead is spread over fewer visits).

We chose to include these observations in our main analysis for two reasons. First, the exclusion of these agencies failed to substantially alter the impact estimates. Second, we anticipate that, under an ongoing prospective payment system, some agencies will leave the business.

3. Inclusion of Agencies with Difficulty Submitting Bills

Seven agencies in the treatment group may have failed to submit a large portion of their bills for services rendered during the demonstration (Archibald and Cheh 2000). Because the nonbilling leads to a smaller number of observed visits than of actual visits, it could cause us to seriously misstate the effects of prospective payment on agencies' service provision. In turn, this could lead to underreporting of Medicare revenues. The underreporting of visits would also lead us to underestimate the cost per episode, as well as to overstate the cost per visit. Because the use of these agencies' data could bias our results, we excluded the seven from our main analysis. However, we include them here to show the effect of their exclusion on our impact estimates.

As expected, including the seven agencies with serious billing problems substantially affected our cost-per-episode and cost-per-visit estimates. The estimated impacts on skilled nursing and home health aide visits were substantially higher when the agencies with billing problems were included, reflecting the fact that more treatment agencies were underreporting their visits, resulting in higher costs per visit. Despite these higher visit costs, the estimated impact for the cost per episode was substantially lower, reflecting the missing visits in the data. However, all the estimated impacts that were significant in the main analysis and that remain significant in this analyses, and all the signs (if not the magnitudes), are consistent.

F. SUMMARY

The evidence presented in this chapter solidly supports the conclusion that home health agencies responded to the payment incentives. The average agency reduced its cost per episode by 14 percent in response to the per-episode payment incentive. This impact was strong and significant over all three years of the demonstration.

The reduction in cost per episode was due solely to decreases in service use—the cost per unit of service actually increased for the prospectively paid agencies. The cost per visit for skilled nursing care rose an average of 14 percent, and the cost of a home health aide visit rose 10 percent. This increase was directly related to the agencies' efforts to decrease their per-episode visits; the agencies that were most aggressive in reducing visits incurred larger cost-per-visit increases. Economies of scale from the reduction in the agencies' overall number of visits explain part of the impact. We investigated whether the remainder could be explained by increases in the length of a skilled nursing visit but found little evidence to indicate that the length of a skilled nursing visit or home health aide visit was increasing. Evidence from the site visits suggests that a number of factors contributed to the increased cost per visit, the most important of which was the increase in the supervision of service utilization.

The combination of the decreased cost per episode and the increase in the cost per visit resulted in agencies earning very small profits on their Medicare business under prospective payment. Although agencies earned profits based on their episode payments, they lost money on their per-visit (outlier) visits. The evidence suggests that agencies earned greater profits over time, partly because, on average, a greater proportion of the agencies' visits were covered under the per-episode payment method. Nevertheless, the very small profits earned on Medicare patients failed to affect overall profitability.

IV. SUBGROUP IMPACTS

It is possible that responses to the incentives of the demonstration differed depending on the individual characteristics of the participating agencies. To investigate this possibility, we reestimated the key overall demonstration impacts presented in Chapter III for a series of agency subgroups most likely to be associated with differences in agency behavior.

A key issue for the agency subgroup analysis is whether the reductions in cost per episode observed for the group of demonstration agencies as a whole were evident for specific agency types. A finding that impacts were significant across most or all agency subgroups strengthens the validity of the main findings and suggests that they may be more easily applied to agencies that did not participate in the demonstration. A second issue is whether demonstration impacts differed for specific subgroups of agencies (for example, for nonprofit versus for-profit agencies). To the extent that differences existed, it suggests that prospective payment offered agencies varying opportunities (or incentives) to achieve savings, and, perhaps profitability, an important consideration when implementing a nationwide payment system.

For each agency subgroup (detailed in Section A), we estimated program impacts on several key measures of cost per episode, cost per visit, and revenues. We then conducted statistical tests to determine (1) whether the program impact for a given subgroup was significantly different from zero; and (2) whether a significant difference existed in the impacts between subgroup pairs (for example, between for-profit and nonprofit agencies).

A. EXPECTED IMPACTS AMONG SUBGROUPS

In this section, we define the specific subgroups we investigated. We also discuss the differences that we expected to find between subgroups.

We examined the following five agency-level characteristics: (1) for-profit status, (2) predemonstration practice patterns, (3) size, (4) auspice, and (5) base-year costs. We then defined the following subgroup pairs:

- Proprietary or nonprofit
- "High-use" practice pattern or "low-use" practice pattern. To define these subgroups, we used a case-mix-adjusted index of agencies' service provision in the base year. High-use agencies have an index value above the median value; low-use agencies are at or below the median value.
- Small size or large size. Small agencies provided fewer than 30,000 visits during the base year; large agencies provided 30,000 visits or more.
- Hospital-based or freestanding
- Below the cost limits or above the cost limits. We defined these subgroups by comparing each agency's base-year cost per visit relative to the Section 223 limits.

Proprietary agencies had a clear incentive under the demonstration to decrease their cost per episode, but nonprofit agencies were affected by a combination of incentives. Like for-profit agencies, nonprofits had an incentive to reduce costs and generate a surplus that could be applied toward charity work, capital improvements, or other objectives. However, they might have resisted this incentive because their mission was focused more exclusively on the well-being of patients or informal caregivers. Moreover, for-profit agencies may have tried to switch Medicare patients to other payer services as a way of improving revenue. On average, therefore, nonprofit agencies might have made considerably smaller reductions in cost per episode in response to prospective payment than did for-profit agencies.

It is likely that agencies exhibiting high-use practice patterns before the demonstration began faced less pressure from managed care organizations (and from other market forces) to control their service provision under cost-based reimbursement than did low-use agencies. Because the high-use agencies made less effort than low-use agencies to control prior utilization, they probably had the opportunity to make larger-scale reductions in visits before patient outcomes would be affected. Thus, these agencies had the potential to lower their per-episode costs more. However, it is also likely that these agencies would provide a higher proportion of outlier visits, and the reduction in outlier visits could lead to greater cuts in Medicare revenue.

Smaller agencies (those with fewer than 30,000 visits per year) might have responded differently to the demonstration incentives than did large agencies in a number of different ways. On the one hand, smaller agencies might have found it easier to communicate with their staff and implement changes more quickly, thereby achieving large reductions in service use and, consequently, in cost per episode. On the other hand, these agencies might have been more hesitant about making large cuts because any losses in volume could have generated sharp increases in per-visit costs (due to economies of scale) and required staff cutbacks. In addition, it is likely that the impact of prospective payment on agency revenue would be much smaller, as these agencies started from a lower revenue base.

Hospital-based agencies have a more general incentive to maximize profits for the entire hospital system, so their response to the demonstration might have differed from that of freestanding agencies. If its principal concern was patient or physician satisfaction with the hospital system, then a hospital-based agency might have largely ignored the incentives of the demonstration to reduce the cost per episode. In addition, such an agency simply might have had little interest in responding to demonstration incentives because its revenues represent only a small fraction of the revenues of the entire system (in fact, a far lower proportion of hospital-based agencies were even attracted to the demonstration [Foster 2000]). However, a hospital-based agency also has advantages that could have allowed it to respond more aggressively to the demonstration. For example, because it has more direct access to referrals, it might have been less concerned with large losses in volume that could result from substantial cuts in visits per patient. The direction of any differences between hospital-based and freestanding agencies is thus uncertain.

Agencies above the cost limits faced very different financial incentives under the demonstration. If prospectively paid agencies that were above their cost limits during the base year failed to change the way they operated, they would have lost money (because their base-year episode payment rates were at the cost limits). Thus, these agencies had to either reduce utilization during the at-risk period to earn profits on their episodes or reduce their per-visit costs. Neither strategy would affect their revenues, however. In contrast, control group agencies above the cost limits had an incentive to increase their visits so as to reduce their cost per visit, which would also lead to increases in revenues.

B. IMPACTS FOR AGENCY SUBGROUPS

In this section, we discuss the impacts on different financial measures. For some types of agencies, because it is easier to understand the impacts on cost per episode in relation to the impacts on visits per episode, we included the impacts on visit per episode for all agency subgroups.

For the most part, nonprofit and for-profit agencies responded similarly to the demonstration incentives. Both types significantly reduced their cost per episode; for-profit agencies decreased costs by $466 per episode, and nonprofits did so by $448 (see Table IV.1). As a proportion of episode costs, nonprofit agencies actually reduced costs slightly more—the $466 impact on for-profit agencies represents a 12 percent decline, whereas the $448 impact represents a 17 percent decline.

TABLE IV.1

AVERAGE ANNUAL IMPACT OF PER-EPISODE PAYMENT ON AGENCY FINANCES: NONPROFIT AND FOR-PROFIT AGENCIES

	Predicted Mean Without Intervention	Impact (*P*-Value)[a]	*P*-Value of Impact
Cost per Episode			
For-profit (N = 156)	3,854	−466	.02
Nonprofit (N = 158)	2,620	−448	.02
P-value for impact differences between subgroups	--	(.95)	
Cost per Skilled Nursing Visit			
For-profit (N = 231)	96.14	12.00	.01
Nonprofit (N = 239)	91.68	13.53	.00
P-value for impact differences between subgroups	--	(.80)	
Cost per Home Health Aide Visit			
For-profit (N = 229)	39.61	7.26	.00
Nonprofit (N = 239)	43.21	0.67	.72
P-value for impact differences between subgroups	--	(.01)	
Visits per Episode			
For-profit (N = 156)	48.60	−9.5	.00
Nonprofit (N = 158)	34.94	−8.1	.00
P-value for impact differences between subgroups		(.72)	
Medicare Visit Revenues per Agency			
For-profit (N = 220)	2,932	−568	.14
Nonprofit (N = 219)	6,026	−1,385	.00
P-value for impact differences between subgroups	--	(.13)	
Total Revenues per Agency			
For-profit (N = 199)	6,403	−1,493	.26
Nonprofit (N = 172)	10,569	−1,753	.23
P-value for impact differences between subgroups	--	(.90)	

SOURCE: Medicare cost reports and bill records. The sample consisted of 40 for-profit agencies and 40 nonprofit agencies. Because of missing data from some agencies, the sample used for the different dependent variables may vary. Total revenues and Medicare visit revenues are expressed in thousands of dollars.

[a] The *P*-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

Contributing to this difference is the fact that the demonstration increased skilled nursing visit costs for both types of agencies, but for-profit agencies had experienced a larger increase in their cost per home health aide visit. Whereas the impact on cost per home health aide visit was large (18 percent) and significant for the profit agencies, it was small and insignificant for the nonprofits.

The impact on Medicare agency revenues for for-profit agencies was substantially less than for nonprofit agencies; however, these differential impacts reflect the difference in the amount of Medicare revenues generated by the two types of providers. For-profit agencies' Medicare revenues declined $568, in contrast to a $1,385 decrease for nonprofit agencies, but these impacts reflect percentage declines of 19 and 23 percent, respectively. The declines in total revenues for prospectively paid agencies were about the same magnitude (-$1,493 for for-profit agencies and -$1,753 for nonprofits), and neither impact was significant at the .1 level.

The demonstration had similar impacts on the financial measures of agencies with low-use practice patterns and of those with high-use patterns, and we failed to find any statistically significant differences. However, the differences in the magnitudes of the estimates were fairly large—suggesting that we failed to detect some differences. Low-use agencies reduced their cost per episode by $556 (or 20 percent), whereas high-use agencies reduced their cost per episode by $412 (or 11 percent). This difference was unexpected (because we expected high-use agencies to reduce visits more), but statistically insignificant (Table IV.2). Both the cost per skilled nursing visit and the cost per home health aide visit increased for both types of agencies, and, in both cases, our estimated impact was nearly double (although statistically insignificant) for the low-use agencies. This difference in cost per visit, which we found in our preliminary analysis (where it was

TABLE IV.2

AVERAGE ANNUAL IMPACT OF PER-EPISODE PAYMENT ON AGENCY FINANCES: LOW-PRIOR-USE AND HIGH-PRIOR-USE AGENCIES

	Predicted Mean Without Intervention	Impact (*P*-Value)[a]	*P*-Value of Impact
Cost per Episode			
Low-use (N = 147)	2,839	-556	.01
High-use (N = 167)	3,610	-412	.03
P-value for impact differences between subgroups	--	(.61)	
Cost per Skilled Nursing Visit			
Low-use (N = 222)	94.59	16.99	.00
High-use (N = 248)	92.46	9.21	.03
P-value for impact differences between subgroups	--	(.20)	
Cost per Home Health Aide Visit			
Low-use (N = 220)	43.79	5.31	.01
High-use (N = 248)	38.97	2.26	.23
P-value for impact differences between subgroups	--	(.27)	
Visits per Episode			
Low-use (N = 147)	34.4	-10.0	.00
High-use (N = 167)	48.8	-8.8	.00
P-value for impact differences between subgroups		(.77)	
Medicare Visit Revenues per Agency			
Low-use (N = 200)	4,742	-925	.02
High-use (N = 239)	4,262	-1,093	.00
P-value for impact differences between subgroups	--	(.76)	
Total Revenues per Agency			
Low-use (N = 175)	6,782	-717	.62
High-use (N = 196)	9,686	-2,946	.03
P-value for impact differences between subgroups	--	(.26)	

SOURCE: Medicare cost reports and bill records. The sample consisted of 38 low-use agencies and 42 high-use agencies. Because of missing data for some agencies, the sample used for the different dependent variables may vary. Total Revenues and Medicare Visit Revenues are expressed in thousands of dollars.

[a] The *P*-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

significant), suggests that low-use agencies may have been able to reduce the number of visits only by implementing relatively more costly measures, such as increased supervision, especially early in the demonstration (Cheh and Trenholm 1999). In contrast, high-volume agencies may have had more "room" to cut visits outright, so that the cost per visit was less affected. The comparison of our earlier results and these final results suggest that as these agencies continued to operate under the demonstration, high-use agencies reduced the number of visits further. As a result of these visit reductions, the cost per visit for some high-use agencies increased substantially, thus closing the gap slightly between the high-use and low-use agencies. Both types of agencies also experienced large and significant declines in agency-level Medicare revenues, and, although the results were significant only for high-use agencies, both had declines in their total revenues.

The evidence is mixed as to whether small agencies and large agencies experienced similar financial impacts. As expected, prospective payment decreased small agencies' average Medicare revenues less than it did those of large agencies (-$189,000 and -$1,311,000, respectively) (Table IV.3). As a percentage of Medicare revenues, however, the impacts were only moderately different (17 percent versus 24 percent). In addition, the differences in the estimated impacts on cost per episode were insignificant. This finding was not surprising, as the differences in impacts on the number of visits and on the cost of skilled nursing and home health aide visits were also insignificant. For two reasons, we hesitate to definitively argue that no differences in cost per episode exist. First, as a proportion of predicted episode costs, small agencies reduced episode costs by much less (7 percent, versus 18 percent for large agencies), despite having roughly the same predicted cost per episode. Second, despite the statistical insignificance of the differences in impacts shown here, we obtain significantly different impacts on cost per episode when we estimate the

TABLE IV.3

AVERAGE ANNUAL IMPACT OF PER-EPISODE PAYMENT ON AGENCY FINANCES: SMALL AND LARGE AGENCIES

	Predicted Mean Without Intervention	Impact (*P*-Value)[a]	*P*-Value of Impact
Cost per Episode			
Small (N = 83)	3,265	-240	.38
Large (N = 231)	3,218	-569	.01
P-value for impact differences between subgroups	--	(.30)	
Cost per Skilled Nursing Visit			
Small (N = 125)	92.64	13.19	.03
Large (N = 345)	94.32	12.51	.00
P-value for impact differences between subgroups	--	(.92)	
Cost per Home Health Aide Visit			
Small (N = 123)	37.16	7.33	.01
Large (N = 345)	42.15	3.63	.02
P-value for impact differences between subgroups	--	(.25)	
Visits per Episode			
Small (N = 83)	43.5	-5.4	.19
Large (N = 231)	41.1	-10.4	.00
P-value for impact differences between subgroups	--	(.24)	
Medicare Visit Revenues per Agency			
Small (N = 112)	1,145	-189	.73
Large (N = 327)	5,552	-1,311	.00
P-value for impact differences between subgroups	--	(.07)	
Total Revenues per Agency			
Small (N = 117)	7,068	-2,487	.15
Large (N = 254)	9,213	-1,573	.16
P-value for impact differences between subgroups	--	(.66)	

SOURCE: Medicare cost reports and bill records. The sample consisted of 22 small agencies and 58 large agencies. Because of missing data from some agencies, the sample used for the different dependent variable may vary. Total Revenues and Medicare Visit Revenues are expressed in thousands of dollars.

NOTE: Size of agency is based on the number of visits rendered in the year prior to entering the demonstration. Small agencies are those with fewer than 30,000 visits. Large agencies are those with 30,000 visits or more.

[a] The *P*-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

differences using two years of postdemonstration experience, with the impact on small agencies smaller than on large agencies (see the tables in Appendix C).

In our preliminary report, we found that prospective payment increased the cost per visit more for small agencies than for large ones (Cheh and Trenholm 1999). Nevertheless, over the three-year period, we failed to observe this pattern. A combination of two factors explains this change. First, starting in the second year of the demonstration, the large treatment agencies' cost per skilled nursing visit increased substantially relative to this cost for the large control agencies (from $94 to $102), most likely reflecting impacts of the prospective payment system as large agencies started aggressively cutting visits (see Figure IV.1). Second, the small control agencies' cost per visit also rose substantially in year 2 (from $82 to $92). This increase reflected the start of the cutbacks due to Operation Restore Trust and managed care growth, which reduced the impact of the prospective payment system on the small agencies.[1] The combination of these two factors reduced the difference in impacts between large and small agencies; as a result, we found no overall difference in the impact when averaged over the three years of the demonstration.

Hospital-based agencies and freestanding agencies seemed to respond differently to the demonstration, but again, the evidence is weak at best. Although the differences in the impact estimates were statistically insignificant, this may be attributed largely to the small number of hospital-based agencies in the sample (Table IV.4). Overall, freestanding agencies significantly reduced their cost per episode by 15 percent ($509). In contrast, hospital-based agencies did not reduce their cost per episode because they failed to reduce their visits per episode even though their cost per skilled nursing visit rose substantially, just as it did for freestanding agencies. The cost per

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[1] ORT and managed care also reduced home health visits at large agencies. However, economics of scale will drive up cost per visit for smaller agencies more than at the larger ones.

FIGURE IV.1

AVERAGE COST PER SKILLED NURSING VISIT, BY DEMONSTRATION YEAR AND AGENCY SIZE

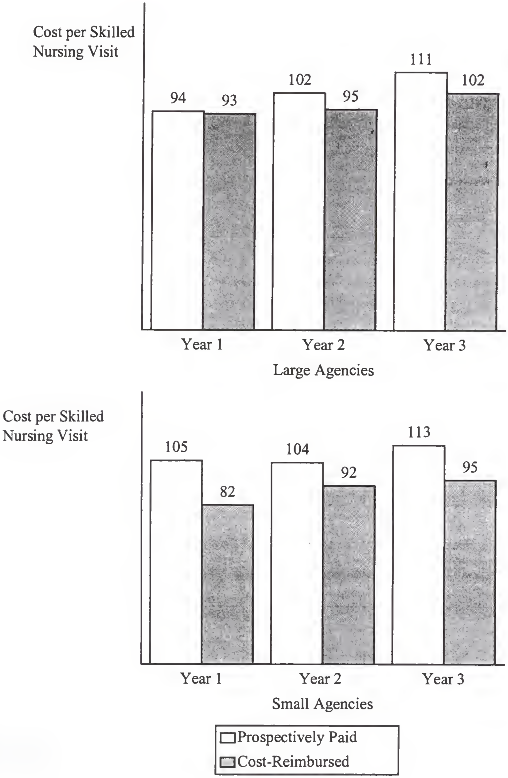

TABLE IV.4

AVERAGE ANNUAL IMPACT OF PER-EPISODE PAYMENT ON AGENCY FINANCES: HOSPITAL-BASED AND FREESTANDING AGENCIES

	Predicted Mean Without Intervention	Impact (*P*-Value)[a]	*P*-Value of Impact
Cost per Episode			
Hospital-based (N = 36)	2,500	- 15.92	.97
Freestanding (N = 278)	3,336	-509.47	.01
P-value for impact differences between subgroups	--	(.28)	
Cost per Skilled Nursing Visit			
Hospital-based (N = 54)	110.55	16.25	.08
Freestanding (N = 416)	91.78	12.46	.00
P-value for impact differences between subgroups	--	(.70)	
Cost per Home Health Aide Visit			
Hospital-based (N = 54)	42.53	-2.64	.53
Freestanding (N = 414)	41.09	4.57	.00
P-value for impact differences between subgroups	--	(.10)	
Visits per Episode			
Hospital-based (N = 36)	28.6	.8	.89
Freestanding (N = 278)	43.5	-9.8	.00
P-value for impact differences between subgroups		(.10)	

SOURCE: Medicare cost reports and bill records. The sample consisted of 9 hospital-based agencies and 71 freestanding agencies.

NOTE: The agency's category is based on its method of operation in the year prior to the demonstration. Because of missing settlement reports for hospital-based agencies, we are unable to estimate subgroup differences on revenue variables. Missing data for some agencies may cause the sample size to vary across dependent variables.

[a] The *P*-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

visit for home health aide care remained steady in prospectively paid hospital-based agencies; in fact, the impact estimate is actually negative (although very imprecise). In contrast, prospective payment had a solid, positive impact on freestanding agencies' home health aide visit costs.[2] This difference is likely due to the fact that hospital-based agencies failed to reduce home health aide visits as the freestanding agencies did (Trenholm 2000a). Thus, the evidence is fairly consistent with our hypothesized effect—that hospital-based agencies focus on keeping their physicians content, instead of reducing visits. They retained their care patterns (with no reductions in visits); and this implies that costs per visit wouldn't change (as with home health aide visits). But if agency behavior did not change, why did skilled nursing per visit costs rise? We cannot identify a mechanism for this result. It appears, however, that prospective payment affects the finances of hospital-based agencies differently, although the small sample size makes it impossible to draw any firm conclusions.

Agencies that were above the cost limits in their base year also seemed to respond differently to the demonstration incentives. (Again, however, the small number of these agencies makes it difficult to detect differences.) Both agencies above the cost limits and those below the limits significantly reduced their cost per episode; however, agencies above the cost limits reduced their costs by 23 percent, whereas those below the limits reduced theirs by only 12 percent (Table IV.5). Agencies above the cost limit achieved this cost-per-episode reduction despite the fact that prospective payment increased their cost per visit more for both skilled nursing and home health aide services than it did for agencies under the cost limits. These results reflect the different options that agencies over the cost limits faced under per-episode payment and under cost-reimbursement. Under either payment system, agencies above the cost limits had a strong incentive to reduce their costs;

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[2] Note that we could not estimate impacts on Medicare revenues, as the supplemental reports were not completed for the hospital-based agencies.

TABLE IV.5

AVERAGE ANNUAL IMPACT OF PER-EPISODE PAYMENT ON AGENCY FINANCES: ABOVE-COST-LIMITS AND BELOW-COST-LIMITS AGENCIES

	Predicted Mean Without Intervention	Impact (*P*-Value)[a]	*P*-Value of Impact
Cost per Episode			
Above cost limits (N = 47)	3,448	-800	.02
Below cost limits (N = 267)	3,193	-392	.01
P-value for impact differences between subgroups	--	(.29)	
Cost per Skilled Nursing Visit			
Above cost limits (N = 70)	113.04	24.00	.00
Below cost limits (N = 400)	90.45	10.95	.00
P-value for impact differences between subgroups	--	(.12)	
Cost per Home Health Aide Visits			
Above cost limits (N = 68)	46.01	10.38	.00
Below cost limits (N = 400)	40.38	2.91	.04
P-value for impact differences between subgroups	--	(.05)	
Visits per Episode			
Above cost limits (N = 47)	38.0	-16.5	.00
Below cost limits (N = 267)	42.4	-7.5	.00
P-value for impact differences between subgroups		(.10)	

SOURCE: Medicare cost reports and bill records. The sample consisted of 12 above-cost-limit agencies and 68 below-cost-limit agencies. Because of missing data for some agencies, the sample size used for the different dependent variables may vary.

[a] The *P*-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

if they did not, they would lose money. The prospectively paid agencies could reduce their costs by (1) lowering service use and reducing their per-episode costs; or (2) lowering their cost per visit, which would lower both their episode costs and their outlier visit costs. Because these agencies had difficulty keeping their costs below the limits before the demonstration, they may have viewed reducing per-visit costs as a less promising way to earn profits and thus chose to lower service use instead. (Indeed, treatment agencies above the limit decreased visits per episode by 43 percent). In contrast, the cost-reimbursed agencies had no choice: they could reduce only their cost per visit. As a result, they had the incentive to *increase* their overall visits to lower overhead costs and reduce their cost per visit so that they would not lose money during the second year.[3] Thus, the options offered by the payment system likely produced the relatively large impact on per-visit costs.

C. SUMMARY

For the most part, our main impact results also hold true for different types of agencies. With the exception of hospital-based agencies and small agencies, all the other types of agencies reduced their episode costs as a result of the demonstration's incentives. Prospective payment increased the cost of a skilled nursing visit for virtually all the different types of agencies, but the impacts on the cost of home health aide visits were slightly weaker, as the costs of the latter visit did not rise consistently across all subgroups. Finally, our estimates show that agency-level Medicare revenues decreased from 20 to 26 percent as a result of prospective payment at most agencies; the exceptions were small agencies and for-profit agencies (which generally are small). Even for small and for-profit agencies, however, the impact estimates were negative and generally of the same (percentage) magnitude as we observed for their larger counterparts.

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[3] Note that they did not have to increase visits; they could have reduced agency costs.

Finally, we failed to identify a pattern of statistically significant differences in the financial measures that would demonstrate clearly whether a particular type of agency had responded differently to the demonstration incentives. This may be due partly to the small number of agencies of some types (particularly, hospital-based agencies and those above the cost limits). But it is also because most agencies responded similarly to the demonstration incentives, although there may have been small differences in how their response affected their finances.

V. CONCLUSIONS

This report addressed the following question: Were agencies able to earn profits under prospective payment? This question is fundamental, because agencies that are unable to earn profits, or at least to break even, are likely to leave the Medicare program, resulting in less access to care. We found that agencies did make profits—albeit very small ones—and it appears that they became better at doing so over time.

A. KEY FINDINGS

Agencies earned their profits by responding to the primary demonstration incentive. In response to prospective payment, they reduced their cost per episode by an average of $457—or 14 percent—leading directly to agency profits. They made this reduction by reducing the number of visits they provided during an episode. Indeed, throughout the demonstration, the prospectively paid agencies continued to reduce their service use, which lowered their cost per episode. However, this reduction did not translate into greater savings estimates over time, as the environment in which the agencies operated changed as well; as a result, control agencies also reduced utilization and cost per episode.

The profits earned from reducing episode costs were offset by an increase in per visit costs, which resulted from efforts to reduce service use. As a result of prospective payment, the per visit costs for skilled nursing and home health aide services rose 14 percent and 10 percent, respectively. These services account for approximately 87 percent of the home health care visits rendered. Reductions in overall agency volume explain part of the increase in the per visit cost (because overall volume fell more rapidly than did agencies' reductions in overhead costs). For example, controlling for agency volume reduced the impact on skilled nursing cost per visit by 21 percent.

In addition, the methods agencies used to reduce the number of visits per episode, such as increased supervision, resulted in higher per visit costs. Because outlier visits were paid at a predetermined rate based on the agency's predemonstration costs, agencies lost money on their outlier visits. These losses lowered the profits earned from per episode payments.

The prospectively paid agencies' Medicare revenues dropped substantially during the demonstration, primarily because these agencies reduced visits in the outlier periods. The average prospectively paid agency's Medicare revenue dropped 20 percent per year relative to the decrease in the cost-reimbursed agencies, mostly reflecting the large decrease in the number of outlier visits. Thus, as agencies put increasing effort into reducing their episode lengths, they also reduced revenue-generating visits that would occur after 120 days; the result was greater savings for the Medicare program.

Prospective payment generally produced strong and significant financial impacts, regardless of the type of agency. With a few exceptions, as a result of the prospective payment system, agencies of every type reduced their cost per episode, increased their cost per skilled nursing and home health aide visit, and reduced Medicare revenues. The limited number of agencies in our analysis sample makes it difficult to determine whether some types of agencies responded differently to the payment system, but the evidence does show that almost all agencies generally responded in the same way to the demonstration's incentives.

B. LIMITATIONS OF THE ANALYSIS

Despite the significance and robustness of our impact findings, this study has limitations. Perhaps the most important limitation is the extent to which we can generalize our findings to home health agencies nationwide. Like any study design based on voluntary participation, the agencies in this demonstration may reflect the group best able (or most willing) to respond to the incentives of the intervention. Indeed, we do know that, relative to agencies nationwide, the demonstration agencies were larger, more fully staffed, and underrepresented the national share of hospital and nonmetropolitan agencies (Foster 2000). Given these observed differences, concern arises that there may be even more unobserved differences that may lead us to under- or overstate the impacts. However, it is important to note that Foster also observed many other measures, especially agency costs, that indicated the demonstration agencies were very similar to agencies nationwide.

A key factor suggesting that our results can be widely generalized is that agencies of all types significantly reduced their cost per episode, increased per visit costs, and reduced the amount of Medicare revenues they received. Thus, even though the mix of demonstration agencies differs significantly from agencies nationwide, we still expect the impacts of the program to substantially affect these financial measures. Hospital-based agencies are a notable exception. Hospital-based agencies have a greater incentive to maximize profits for the overall hospital system; thus, their response to the demonstration might have differed from that of freestanding agencies. We have only a small number of hospital-based demonstration agencies and limited data for those that are enrolled; thus, the evidence we obtained may not indicate accurately how these agencies will be affected under a national prospective payment system.

A second limitation, related to the issue of generalizability, is that the national program of prospective payment will differ from the one implemented for the demonstration. For example, the new payment system will pay for a series of 60-day episodes, thus eliminating the need for a per visit outlier payment. This new payment system could substantially alter the financial impact of prospective payment, as agencies still would have an opportunity to make profits in later periods, even if their cost per visit rose, as it did in the demonstration.

A final limitation is that the time-limited nature of the demonstration may cause effects to vary from those that would result from a permanent policy change. Agencies may respond to payment incentives that they view as temporary differently from the way they would respond to incentives viewed as permanent. For example, in a permanent payment system, agencies may focus on lowering their overhead costs and may take aggressive actions, such as merging with other agencies, to lower the impact of the cost per visit. However, under the temporary payment system, agencies may have been far less likely to make these significant changes, especially as the environment to which the agencies may have been returning was changing dramatically, and the Medicare payment system to which they were returning was in the process of being altered. Thus, agencies were less likely to make costly organizational changes for a limited profit opportunity, suggesting that the short-term financial impacts of prospective payment may have been overstated or understated.

C. LESSONS LEARNED

The evidence clearly shows that home health agencies will respond to financial incentives, such as those offered by the demonstration prospective payment system, and suggests that a new payment system based on these principles will enable HCFA to save resources. In addition, however, HCFA must be prepared to adjust for unintended consequences of the new payment system. In the early stages of the demonstration, for example, agencies perceived that the per visit payment system for visits after 120 days was a safeguard (Phillips and Thompson 1997). The agencies were concerned about the effect that a high-volume patient would have on them, rather than about whether they had to control their cost per visit. Indeed, agencies had struggled to keep their cost per visit below the cost limits for years—and had done so successfully—so they viewed the risk of increasing costs per visit as relatively minor relative to the risk of having a patient with high-cost care needs. Yet, this per visit payment system proved to be the key factor that limited agencies' profitability. Thus, it is important that HCFA monitor the payment system, and that it be prepared to make adjustments if unintended financial issues should arise.

In addition, HCFA must closely monitor the effect of a new payment system on agencies operating in sparsely populated areas. Our estimates show that part of the increase in cost per visit was due to the reduction in overall agency volume. Under a permanent system, one would expect agencies to consolidate so as to reduce their costs and recapture the economies of scale they lost when their volume declined. Sole agencies in sparsely populated areas may not be able to take this step.

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APPENDIX A

SUMMARY OF CASE-MIX ADJUSTMENT FOR PAYMENTS DURING THE DEMONSTRATION

During the demonstration, agency payment rates are adjusted for severity using the Home Health Utilization Groups (HHUGs) Classification system. This system, which was specifically developed for the demonstration, classifies patients into 1 of 18 mutually exclusive cells on the basis of the following information:

- Whether the patient has an intervening hospital stay in an acute-care hospital during the 120 days following a home health admission
- Whether the patient was impaired in at least four of five activities of daily living (bathing, eating/tube feeding, dressing, toileting/elimination, and transferring) at home health admission
- Whether wound care was planned for the patient at home health admission
- Whether the patient was discharged from a hospital within the 14 days preceding home health admission
- Whether the patient had stage 3 or stage 4 decubitus ulcer at home health admission
- Whether the patient had cancer at home health admission that affected current treatment or personal-care needs
- Whether the patient has had a cerebrovascular accident that affected current treatment or personal-care needs
- Whether the patient had diabetes that affected current treatment or personal-care needs

As with payment rates, demonstration case-mix adjustment is based on the agency's base-period experience. Information on the characteristics listed above was collected on each patient admitted to each agency in the 90 days ("base quarter") before it began to operate under the demonstration. The same information was collected throughout the demonstration in the "remarks" section of the Uniform Bill, HCFA form 92 (UB-92).

Using the base quarter information, Abt calculated a base quarter index for each agency as follows. First, Abt calculated a category weight for each of the 18 case-mix groups by dividing the average cost in each group by the agency's overall average cost.[1] Abt then multiplied each category weight by the percentage of episodes that fell into each case-mix category during the base quarter, and summed across all 18 categories. The result is a base quarter index for each agency, which is always equal to 1.

To obtain the annual case-mix-adjusted rates, Abt calculated a similar index for the demonstration years by multiplying the category weight from the base year times the percentage of episodes that fell into each case-mix category during the relevant year, and then summing across all 18 categories.

The demonstration year index for each agency is then divided by the agency's base quarter index and multiplied by the agency's base year episode rate. This results in the case-mix-adjusted episode rate.

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[1] If an agency did not have any observations in a particular category during the base quarter, the average cost for that casemix group calculated across all demonstration agencies was used instead of an agency-specific cost.

APPENDIX B

SUPPLEMENTAL TABLES

TABLE B.1

IMPACTS OF PROSPECTIVE PAYMENT ON THE NUMBER OF VISITS PER EPISODE

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Total Visits	-8.81* (.00)	41.74	-8.07* (.00)	43.91	-7.39* (.00)	40.26	-10.99* (.00)	40.99
Skilled Nursing (n = 314)	-4.15* (.00)	20.36	-4.21* (.00)	21.20	-2.58* (.04)	19.27	-5.68* (.00)	20.64
Home Health Aide (n = 314)	-3.69* (.00)	14.01	-3.15* (.02)	15.40	-3.78* (.00)	13.83	-4.13* (.00)	12.70
Physical Therapy (n = 314)	-0.63 (.09)	5.54	-0.45 (.32)	5.45	-0.65 (.15)	5.38	-0.78 (.09)	5.81
Occupational Therapy (n = 314)	-0.18 (.07)	0.92	-0.14 (.25)	0.87	-0.25* (.05)	0.92	-0.16 (.22)	0.96
Speech Therapy (n = 314)	-.05 (.35)	0.27	-.04 (.55)	0.32	-.05 (.44)	0.25	-.07 (.36)	0.24
Medical Social Worker (n = 314)	-0.11 (.13)	0.64	-0.08 (.40)	0.66	-0.08 (.40)	0.61	-0.18* (.05)	0.65

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 88 agencies provided a total of 314 agency years of data during the four-year period.

NOTE: p-values are in parentheses. Regressions control for changes in the total number of a given type of visit.

[a] These impact estimates indicate the average annual change during the three years of the demonstration.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.

^Significantly different from year one impact at the .10 level.

TABLE B.2

IMPACTS OF PROSPECTIVE PAYMENT ON AGENCY HOME HEALTH VISIT COMPOSITION

	Entire Demonstration Period		Demonstration Year 1		Demonstration Year 2		Demonstration Year 3	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]	Impact	Predicted Mean Without Intervention[b]
Skilled Nursing (n = 470)	0.23* (.02)	.459	0.11 (.41)	.449	.032* (.02)	.447	.024 (.08)	-4.82
Home Health Aide (n = 468)	-.012 (.23)	.401	.007 (.63)	.422	-.019 (.16)	.416	-.023 (.11)	.362
Physical Therapy (n = 450)	-.004 (.48)	.103	-.010 (.19)	.094	-.005 (.54)	.100	.003 (.68)	.115
Occupational Therapy (n = 399)	-.004 (.12)	.019	-.004 (.26)	.017	-.005 (.19)	.018	-.004 (.35)	.023
Speech Therapy (n = 405)	-.004 (.16)	.007	-.005 (.21)	.008	-.005 (.18)	.008	-.001 (.73)	.006
Medical Social Worker (n = 444)	.001 (.39)	.011	.001 (.39)	.011	.001 (.32)	.011	-.000 (.99)	.012

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 80 agencies in the analysis provided a total of 470 agency years during the six-year period.

NOTE: p-values are in parentheses. The dependent variable is the proportion of an agency's total number of home health visits in a given year attributable to a particular type of home health visit.

[a] These impact estimates indicate the average annual change during the three years of the demonstration.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

*Significantly different from zero at the .05 level, two-tailed test.

TABLE B.3

COMPARISON OF IMPACTS OF PROSPECTIVE PAYMENT ON COST PER VISIT WITH CONTROLS FOR VOLUME AND PATIENT CHARACTERISTICS

	Baseline Model with Six Years of Data		Baseline Model with Four Years of Data					
	No Additional Controls		No Additional Controls		Control for Volume		Controls for Volume and Patient Characteristics[c]	
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Average Annual Impact[a]	Predicted Mean Without Intervention[b]
Skilled Nursing	12.78* (.00)	93.91	11.94* (.01)	94.33	10.03* (.02)	95.27	7.47 (.08)	96.40
Home Health Aide	4.02* (.00)	41.24	6.00* (.00)	40.25	5.76* (.00)	40.36	5.95* (.00)	40.18
Physical Therapy	11.44 (.10)	105.30	4.11 (.70)	109.02	2.84 (.79)	109.66	12.87 (.23)	104.40
Occupational Therapy	3.21 (.71)	118.59	-1.81 (.88)	121.08	-2.78 (.82)	121.56	-3.39 (.78)	121.85
Speech Therapy	9.02 (.40)	118.60	5.80 (.67)	120.19	4.33 (.76)	120.91	4.66 (.74)	120.78
Medical Social Worker	28.24* (.01)	146.90	22.77 (.11)	149.58	19.85 (.15)	151.01	18.32 (.19)	152.21

SOURCE: See notes Table III.2 for baseline model with six years of data. Results for the baseline model with four years of data are based on Medicare cost reports from the three years of the demonstration and one prior year. The 80 participating agencies provided a total of 315 agency years of data during the four-year period. Because of missing data from some agencies, the sample used for the different dependent variables may vary.

NOTE: p-values are in parentheses.

[a] These impact estimates indicate the average annual change during the three years of the demonstration.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Patient characteristics controlled for at the agency level are the proportion of patients who are less than age 65, age 75 to 84, female, white, and whose original reason for Medicare eligibility was that they reached age 65.

*Significantly different from zero at the .05 level, two-tailed test.

TABLE B.4

IMPACTS OF PROSPECTIVE PAYMENT ON COST PER VISIT
CONTROLLING FOR VISITS PER EPISODE

	Baseline Model[c]		Baseline Model with Control for Number of Visits Per Episode [c]		
Dependent Variable	Average Annual Impact[a]	Predicted Mean Without Intervention[b]	Average Annual Impact	Coefficient on Number of Visits Per Episode[d]	Predicted Mean Without Intervention[b]
Skilled Nursing (n=315)	11.94* (.01)	94.33	6.54 (.12)	-1.19* (.00)	96.84
Home Health Aide (n=315)	6.00* (.00)	40.25	4.79* (.01)	-0.28* (.01)	40.75
Physical Therapy (n=304)	4.11 (.70)	109.02	2.24 (.83)	-5.44* (.00)	109.73
Occupational Therapy (n=273)	-1.81 (.88)	121.08	-4.47 (.71)	-11.08 (.14)	122.40
Speech Therapy (n=274)	5.80 (.67)	120.19	3.39 (.80)	-31.07* (.04)	121.37
Medical Social Worker (n=297)	22.77 (.11)	149.58	20.32 (.14)	-32.40* (.01)	151.21

SOURCE: These estimates are based on Medicare cost reports from the three years of the demonstration and one prior year. The 80 participating agencies provided a total of 315 agency years of data during the four-year period. Because of missing data from some agencies, the sample used for the different dependent variable may vary.

NOTE: p-values are in parentheses.

[a] These impact estimates indicate the average annual change during the three years of the demonstration.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] These results reflect the same outcomes as those in Table III.2, but only four years of data are used to allow for the additional control for the number of visits per episode.

[d] This column reports the effect of a one vist per episode increase.

*Significantly different from zero at the .05 level, two-tailed test.

APPENDIX C

SUBGROUP ESTIMATES USING TWO YEARS OF DEMONSTRATION DATA

In our analysis of agency subgroups, we are hampered by the fact that the number of agencies in some subgroups is very small. However, what becomes more problematic is that because of the missing settlement reports (or other missing information), which generally takes place in the final year of the demonstration, the agencies who are observed in that year are given relatively more weight, which could affect our results. To investigate this issues, we re-estimated our subgroup impacts using the first two years of demonstration data. We found no differences that changed our interpretation. The following tables show these impact estimates.[1]

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[1] Estimates using the first year of data may be found in Cheh and Trenholm, 1999.

TABLE C.1

IMPACT OF PER EPISODE PAYMENT ON AGENCY FINANCES: NONPROFIT AND FOR-PROFIT AGENCIES

	Predicted Mean Without Intervention	Impact (p-value)[a]	p-value of Impact
Cost-per-Episode			
For-profit (N=120)	3,735	-323.37	(.09
Non-profit (N=120)	2,587	-401.13	(.03)
P-value for impact differences between subgroups	-	(.77)	
Cost per Skilled Nursing Visit			
For-profit (N=195)	94.93	10.82	.00
Non-profit (N=200)	87.66	12.42	.00
P-value for impact differences between subgroups	-	(.76)	
Cost Per Home Health Aide Visits			
For-profit (N=93)	40.02	4.86	.02
Non-profit (N=200)	40.55	1.49	.45
P-value for impact differences between subgroups	-	(.23)	
Medicare Visit Revenues			
For-profit (N=194)	2,917	-335	.37
Non-profit (N=192)	6,517	-1,264	.00
P-value for impact differences between subgroups	-	(.08)	
Total Revenues			
For-profit (N = 170)	7,414	-2,636	(.04)
Non-profit (N=145)	10,857	-1,529	(.30)
P-value for impact differences between subgroups	-	(.57)	

SOURCE: Medicare Cost Reports and Bill Records. Sample Size: 40 for-profit, 40 nonprofit agencies. Because of missing data from some agencies, the sample used for the different dependent variable may vary. Total revenues and Medicare visit revenues are expressed in thousands of dollars.

[a] The p-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Data for the final year of the demonstration have been excluded from these calculations.

TABLE C.2

IMPACT OF PER EPISODE PAYMENT ON AGENCY FINANCES: LOW PRIOR USE AND HIGH PRIOR USE AGENCIES

	Predicted Mean Without Intervention	Impact (p-value)[a]	p-value of Impact
Cost-per-Episode			
Low-use (N=114)	2,795	-437.62	(.03)
High-use (N=126)	3,531	-360.22	(.05)
P-value for impact differences between subgroups	-	(.77)	
Cost per Skilled Nursing Visit			
Low-use (N=188)	92.77	17.07	.00
High-use (N=207)	89.52	5.44	.15
P-value for impact differences between subgroups	-	(.03)	
Cost Per Home Health Aide Visits			
Low-use (N=186)	41.55	5.89	.01
High-use (N=206)	38.59	.067	.73
P-value for impact differences between subgroups	-	(.07)	
Medicare Visit Revenues			
Low-use (N=150)	4,803	-993	.01
High-use (N=165)	4,591	-650	.08
P-value for impact differences between subgroups	-	(.52)	
Total Revenues			
Low-use (N=150)	6,751	-877	.54
High-use (N= 165)	10,973	-3,503	.01
P-value for impact differences between subgroups	-	(.18)	

SOURCE: Medicare Cost Reports and Bill Records. Sample Size: 38 low use, 42 high use agencies. Because of missing data for some agencies, the sample used for the different dependent variables may vary. Total Revenues and Medicare Visit Revenues are expressed in thousands of dollars.

[a] The p-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Data for the final year of the demonstration have been excluded from these calculations.

TABLE C.3

IMPACT OF PER EPISODE PAYMENT ON AGENCY FINANCES: SMALL AND LARGE AGENCIES

	Predicted Mean Without Intervention	Impact (p-value)[a]	p-value of Impact
Cost-per-Episode			
Small (under 30,000 visits) (N=66)	3,102	-10.71	.97
Large (over 30,000 visits) (N=174)	3,165	-513.87	.00
P-value for impact differences between subgroups	-	(.10)	
Cost per Skilled Nursing Visit			
Small (under 30,000 visits) (N=107)	89.79	14.04	.01
Large (over 30,000 visits) (N=288)	91.81	10.50	.00
P-value for impact differences between subgroups	-	(.57)	
Cost Per Home Health Aide Visit			
Small (under 30,000 visits) (N=105)	37.11	5.79	.04
Large (over 30,000 visits) (N=288)	40.88	3.01	.07
P-value for impact differences between subgroups	-	(.40)	
Medicare Visit Revenues			
Small (under 30,000 visits) (N=102)	1,150	-249	.63
Large (over 30,000 visits) (N=284)	5,951	-1,044	.00
P-value for impact differences between subgroups		(.19)	
Total Revenues			
Small (under 30,000 visits) (N=101)	9,327	-5,456	(.00)
Large (over 30,000 visits) (N=214)	9,431	-1,275	(.26)
P-value for impact differences between subgroups	-	(.04)	

SOURCE: Medicare Cost Reports and Bill Records. Sample Size: 22 small agencies, 58 large agencies. Because of missing data from some agencies, the sample used for the different dependent variable may vary. Total revenues and Medicare visit revenues are expressed in thousands of dollars.

NOTE: Size of agency is based on the number of visits rendered in the year prior to entering the demonstration. Total Revenues and Medicare Visit Revenues are expressed in thousands of dollars.

[a] The p-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Data for the final year of the demonstration have been excluded from these calculations.

TABLE C.4

IMPACT OF PER EPISODE PAYMENT ON AGENCY FINANCES: HOSPITAL-BASED AND FREESTANDING AGENCIES

	Predicted Mean Without Intervention	Impact (p-value)[a]	p-value of Impact
Cost-per-Episode			
Hospital-based (N=27)	2,503	-131.63	.75
Freestanding (N=213)	3,248	-410.77	.00
P-value for impact differences between subgroups	-	(.22)	
Cost per Skilled Nursing Visit			
Hospital-based (N=45)	105.36	20.21	.02
Freestanding (N=350)	89.80	10.41	.00
P-value for impact differences between subgroups	-	(.26)	
Cost Per Home Health Aide Visits			
Hospital-based (N=45)	40.08	0.86	(.85)
Freestanding (N=348)	40.33	3.23	(.03)
P-value for impact differences between subgroups	-	(.61)	

SOURCE: Medicare Cost Reports and Bill Records. Sample Size: 9 hospital-based agencies, 71 freestanding agencies.

NOTE: The agency's category is based on its method of operation in the year prior to the demonstration. Because of missing settlement reports for hospital-based agencies, we are unable to estimate subgroup differences on revenue variables. Missing data for some agencies may cause the sample size to vary across dependent variables.

[a] The p-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Data for the final year of the demonstration have been excluded from these calculations.

TABLE C.5

IMPACT OF PER EPISODE PAYMENT ON AGENCY FINANCES: ABOVE COST LIMITS AND BELOW COST LIMITS AGENCIES

	Predicted Mean Without Intervention	Impact (p-value)[a]	p-value of Impact
Cost-per-Episode			
Above Cost Limits (N=36)	3,513	-835.90	.02
Below Cost Limits (N=204)	3,097	-277.56	.06
P-value for impact differences between subgroups	-	(.13)	
Cost per Skilled Nursing Visit			
Above Cost Limits (N=59)	113.19	121.71	.00
Below Cost Limits (N=536)	87.50	9.75	.00
P-value for impact differences between subgroups	-	(.11)	
Cost Per Home Health Aide Visits			
Above Cost Limits (N=57)	45.14	10.07	.00
Below Cost Limits (N=336)	39.36	2.00	.18
P-value for impact differences between subgroups	-	(.04)	
Medicare Visit Revenues			
Above Cost Limits (N=54)	3,382	-591	.41
Below Cost Limits (N=332)	4,871	-811	.01
P-value for impact differences between subgroups	-	(.78)	
Total Revenues			
Above Cost Limits (N=43)	8,091	-4,146	.12
Below Cost Limits (N=272)	19,330	-2,124	.04
P-value for impact differences between subgroups	-	(.48)	

SOURCE: Medicare Cost Reports and Bill Records. Sample Size: 12 above cost limits, 68 below cost limit agencies. Because of missing data for some agencies, the sample used for the different dependent variables may vary.

[a] The p-value for each outcome corresponds to a test of whether the impacts for the two subgroups are statistically different from one another.

[b] The predicted means without intervention represent our best estimate of what the mean values for agencies would have been in the absence of the demonstration. It is calculated as the average of the predicted mean from the regression for the control agencies and the predicted mean minus the impact estimate for the treatment agencies.

[c] Data for the final year of the demonstration have been excluded from these calculations.

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